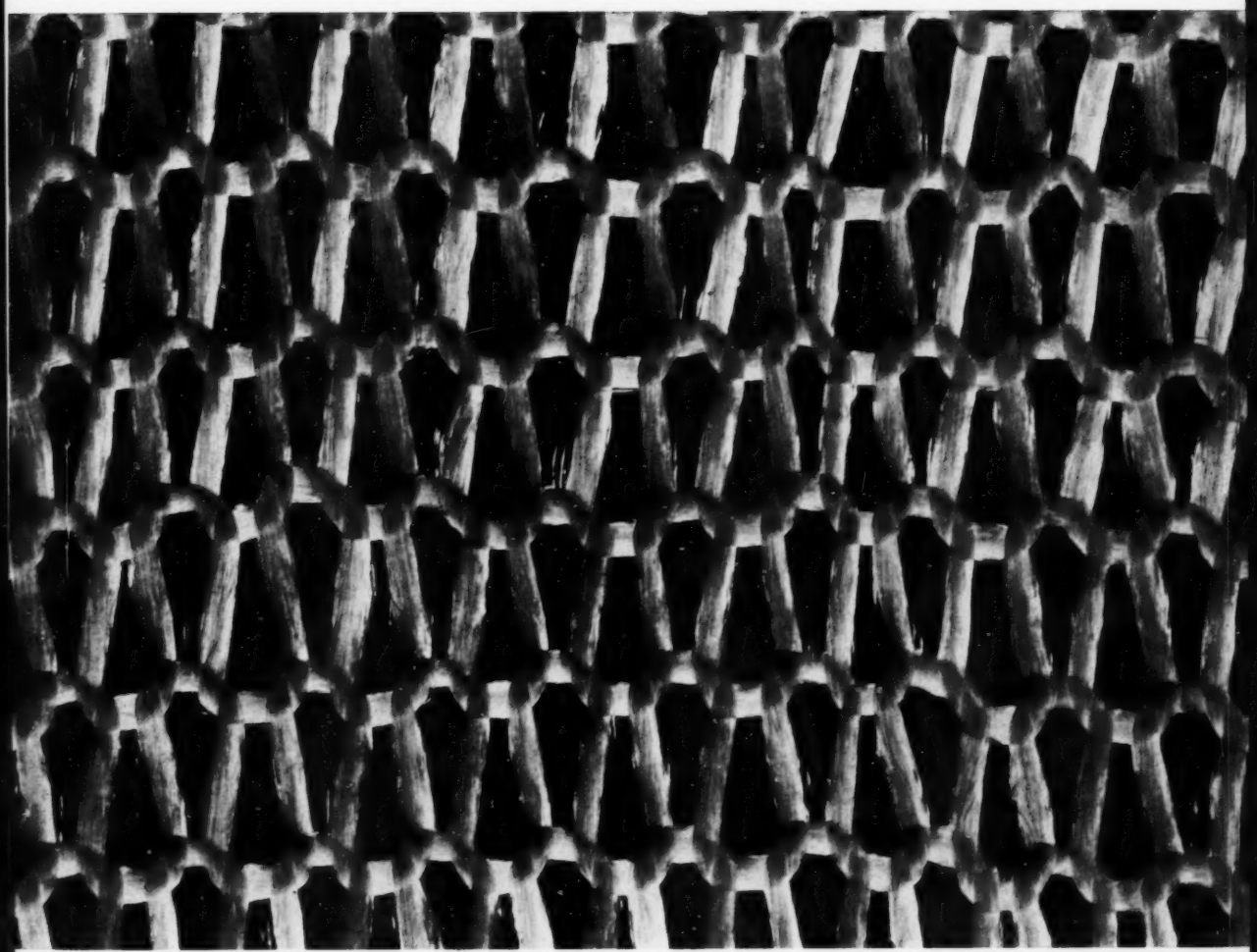
AMERICAN DENTAL ASSOCIATION

AUGUST 1961

dental abstracts

a selection of world dental literature

VOL. 6 NO. 8



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VOLUME 6 · NUMBER 8

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Front cover A magnified view of absorbable hemostat knitted fabric. The illustration is an enlargement of Figure 1, Type A on page 451. Photo courtesy of Johnson & Johnson.

news and notes

B. F. Dewel, one of the editorial consultants for DENTAL ABSTRACTS, was asked to comment on the abstract of an article entitled "Some observations on American orthodontics," by R. W. Halliday, an Australian orthodontist. The abstract appears on page 454 of this issue. Dr. Dewel's comments are as follows:

"Dr. Halliday's estimate of 30 graduate orthodontic departments in American dental schools is too liberal; a more realistic figure would be 20. There is, moreover, no question but that the Tweed principles in orthodontic treatment have been accepted at least in part in virtually all graduate departments. Very likely the Tweed influence is greater in the Western states, but it is doubtful that even Dr. Tweed would claim that his procedures have been adopted universally in the West, either in the dental schools or in private practice.

"It will come as a surprise to American orthodontists that Australian orthodontists are not a 'part and parcel' of the Australian Dental Association. In this country, every orthodontist must be a member of the American Dental Association before he can join the American Association of Orthodontists. Today there exists a closer liaison between the American Dental Association and the American Association of Orthodontists than ever before.

"Apparently, the Australian Society of Orthodontists has already effected a compromise between the English and American patterns. It presently has 42 active members in exclusive orthodontic practice, and 65 associate members. Dr. Halliday's recommendation for some form of certification for Australian orthodontists may yet come to pass; the Australian Society recently has made inquiries of the American Board of Orthodontics on its organization, purposes and procedures, with the implication that a similar certifying agency may be established in Australia."

CORRECTIONS

An abstract of an article entitled "Effect of selenium on the incidence of dental caries in albino rats" (Girolamo Pappalardo *Minerva stomat.* 8:748-751 Nov. 1959) appeared on page 681 in the November 1960 issue of DENTAL ABSTRACTS. The abstract incorrectly reported that intraperitoneal injections of a selenium-sodium compound in minute doses produced a significant decrease in the caries incidence in albino rats, and also that five groups of rats were used in this experiment. Pappalardo had reported that selenium was given to the animals orally, that only two groups of female rats were used (control and experimental), and that selenium increased caries in the rat. In ten control rats, 34.16 per cent of the molars were carious and in ten experimental animals 36.66 per cent of the molars were carious.

An abstract of an article entitled "Fluorine dosages" by H. D. Cremer appeared in the February 1961 issue of DENTAL ABSTRACTS. The abstract incorrectly reported that children living in communities where fluoridation of drinking water is not feasible were using sodium fluoride tablets (each tablet containing 80 mg. sodium fluoride). Cremer's article did not describe the content of dietary fluoride tablets. Tablets intended for use in localities where the drinking water is substantially devoid of fluoride commonly contain not more than 2.2 mg. sodium fluoride.

Published monthly by the American Dental Association at 1009 Sloan Street, Crawfordsville, Indiana. Entered as second class matter at the Post Office at Crawfordsville, Indiana, under the act of March 26, 1956. Change of address notices, undeliverable copies, orders for subscriptions, and other mail items are to be sent to editorial and executive offices, 222 East Superior Street, Chicago 11, Illinois. Printed in U.S.A. Subscription $8.00 a year in U.S.A.; $9.00 outside U.S.A. Single copy $1.00. Issue of August 1961, Vol. 6, No. 8. Copyright 1961 by the American Dental Association. All expressions of opinion and statements of supposed fact are those of the author of the abstracted article and are not to be regarded as expressing the views of the American Dental Association unless such opinions or statements have been adopted by the Association.

a new hemostatic surgical sponge for oral surgical procedures

N. GEORGIADE; T. MITCHELL; J. LEMLER, AND J. HEID, DURHAM, N. C.

Success in the postoperative management of many dental and oral surgical problems depends to no small degree on obtaining adequate hemostasis during the surgical procedure. Recently, several new hemostatic agents have become available. So-called absorbable sponges, of such materials as cornstarch, gelatin and oxidized cotton, and absorbable bone wax have been used with varying degrees of success. During the past year, a new absorbable hemostatic surgical packing material (Surgicel) has been available to the authors for clinical and laboratory evaluation. The material is prepared from regenerated alpha cellulose with a uniform molecular weight lower than that of cotton. It is available in two forms, a fabric or a knitted strip (on front cover and Fig. 1). The material is soft and easily adaptable to any type of surface. It can be handled readily by the usual methods, usually with the aid of a tissue forceps. The oxidized regenerated cellulose dressing is a polyanhydrogluconic acid with an affinity for hemoglobin resulting in the formation of a gel with the blood in a pH range of 3.5 to 4.5.

In the initial experiment, 50 extractions were performed on laboratory rats. The sockets were covered with Surgicel, as well as with gelatin sponges. The animals were sacrificed in three-day periods serially, and histologic sections were obtained through the surgical sites, showing the gradual absorption of the hemostatic agent (Fig. 2-4). The material appeared to be absorbed completely within a 21 day period. No foreign body reaction was noted throughout the series.

After this initial laboratory evaluation, 1,036 dental or oral surgical patients had the new hemostatic surgical packing applied to bleeding

Figure 1 Three types of Surgicel used. Type A was easiest to handle. Types B and C were used to pack loosely in cystic regions and after removal of deeply impacted teeth

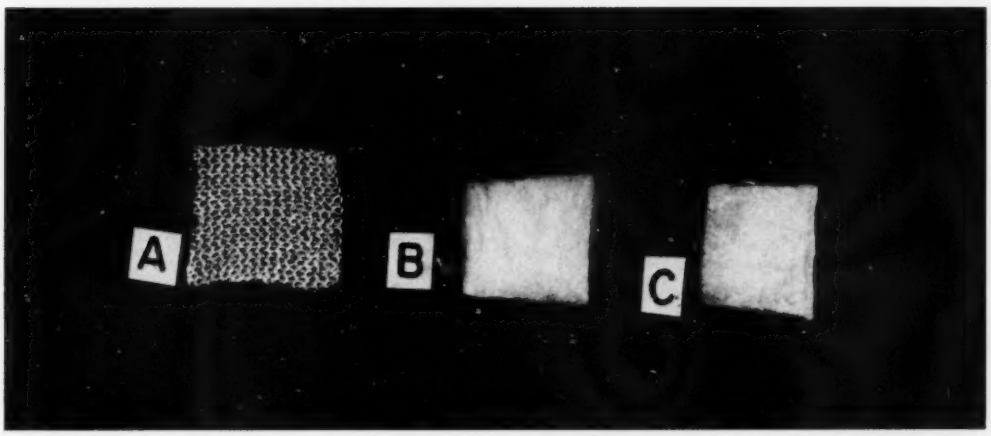


Figure 2 Left: low magnification of symphysis of dog ten days after insertion of hemostatic agent. Area outlined in black shown in high magnification at right. Right: high magnification reveals large pieces of hemostatic gauze with some absorption and infiltration of capillaries and fibroblastic proliferation

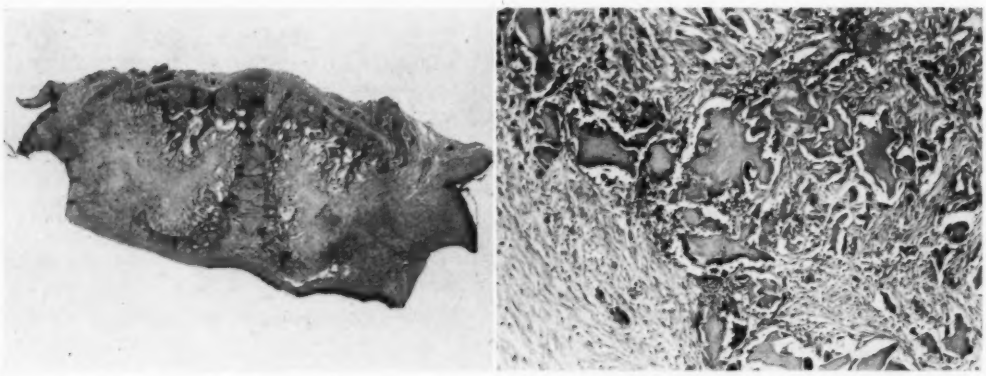


Figure 3 Left: low magnification of symphysis of dog at 14 days. Note considerable decrease in area of hemostatic gauze. Right: higher magnification of view at left reveals further increase of resorption of other gauze with increased capillary penetration and fibroblastic infiltration

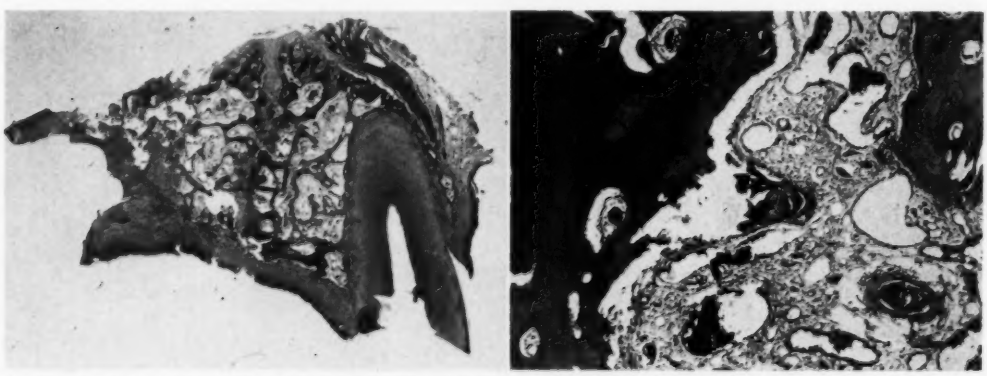


Figure 4 Left: low magnification of symphysis of dog at 20 days. Note complete absorption of gauze. Right: higher magnification showing outlined area of view at left reveals complete resorption of gauze with osteogenesis in progress

Figure 5 Left: maxillary cystic cavity being loosely filled with hemostatic gauze. Right: labial flap sutured tightly over defect

areas. The hemostatic agent was used in 338 instances of multiple extractions, 333 instances of single extractions, 6 extractions in hemophiliac patients, 210 instances of one or more impacted teeth, 20 instances of gingival hemorrhage, 20 instances of excision biopsies, 18 mandibular cysts, 10 maxillary cysts, 6 radical neck dissections, 8 cleft palate repairs, and so forth.

No untoward effect from this material was noted postoperatively. Bleeding was controlled easily. The material now is being used routinely for all impactions and in any bleeding regions that are of concern in removal of cysts (Fig. 5) or after multiple extractions and alveoloplasties (Fig. 6).

It is believed that the material represents a useful adjunct in any oral surgical procedure necessitating maximum hemostasis.

Georgiade, N.; Mitchell, T.; Lemler, J., and Heid, J. Duke University Medical Center, Durham, N.C. Use of a new improved hemostatic sponge in oral surgery. J.Oral Surg.,Anesth. & Hosp.D.Serv. 19:215-219 May 1961

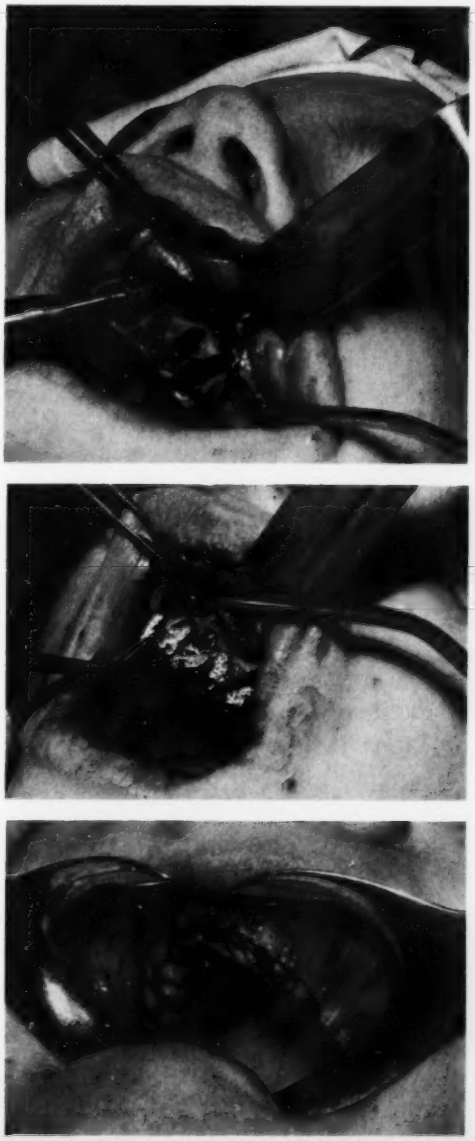


Figure 6 Above: postoperative view after multiple extractions and alveoplasty. Center: loose packing of tooth sockets with woven hemostatic gauze. Below: operative site after suturing of extraction and alveoplasty wounds. Note excellent hemostasis

Some observations on American orthodontics

R. W. HALLIDAY

A visit to the United States of America is always an inspiring and profitable experience. The vastness of its dental organization is overwhelming. Of the 100,000 dentists, there are about 2,000 orthodontists serving a population of 180 million. This gives a ratio of 1 orthodontist to every 90,000 persons. In Australia the ratio is 1:200,000.

In the 30 or so dental schools offering graduate studies in orthodontics, the course of study ranges from 18 to 24 months and leads to a Master of Science degree. The average cost for tuition is $1,350 plus another $500 for books and instruments. In the Western states only Tweed's edgewise system is taught and consequently practiced by the orthodontists. In the Eastern states, each school teaches a variety of systems—in the main, Tweed's and the Johnson twin wire arch appliance, Oliver's labiolingual appliance, and Crozart's removable all-metal appliance.

Attendance at the graduate courses usually is limited to ten students, selected from about four times that number of applicants. The demand for orthodontic service is increasing rapidly because of the steep rise in population. An inevitable shortage of orthodontists will occur unless urgent measures are adopted.

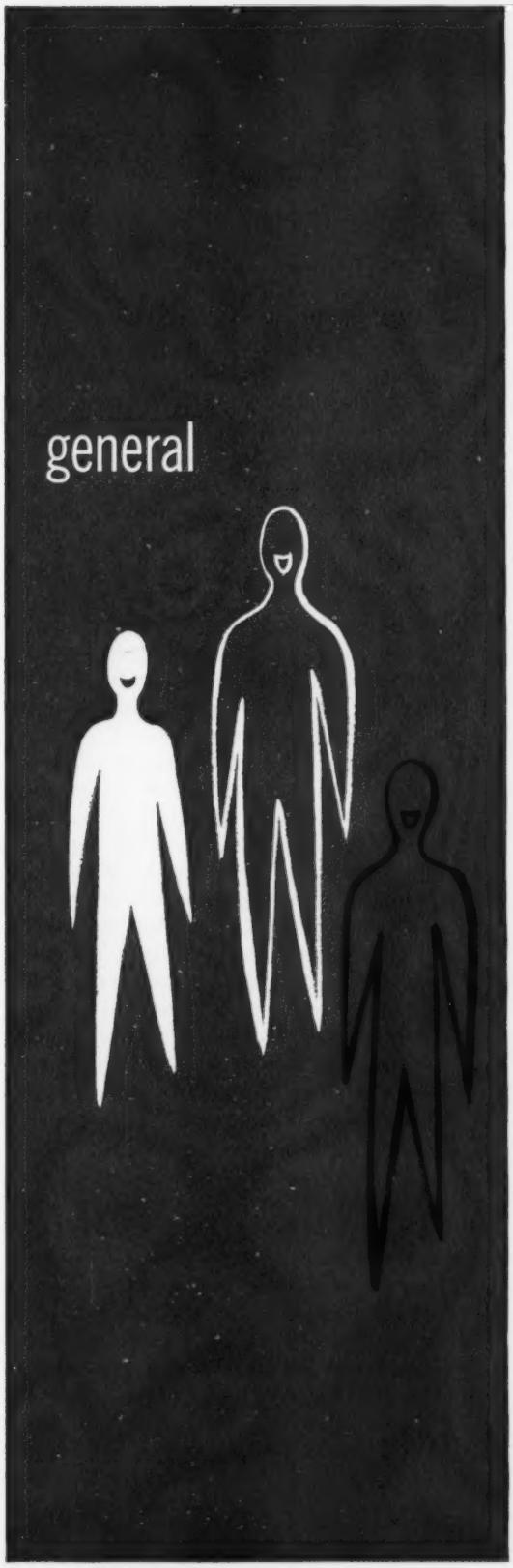
Compared to Australian standards, the American orthodontist generally has twice the space and facilities to work in, has twice the amount of chairside assistance, sees half the number of patients, and receives three times the remuneration in fees. Perhaps he works longer hours, and treats each patient with meticulous care. His appliances are elaborate and he aims for perfection. He is keen and interested. He is found not only in the large cities but in the country towns, suburbs and villages. He is a most gracious and hospitable host to the overseas visitor.

It would be well for Australia to follow the American pattern and have the orthodontists part and parcel of the Australian Dental Association. We as orthodontists are dentists first and can lay no claim to superiority or something outside the kith and kin of the competent practitioner in general dentistry. Only by mutual respect and cooperation between the Australian Society of Orthodontists and the Australian Dental Association can the best interests of the public be served and the profession progress.

By American standards, fees in all branches of Australian dentistry are ridiculously low. The dentists in this country have shouldered alone the burden of inflation. Fewer men are entering the dental profession. This problem could be remedied by some form of dental benefits scheme. In the meantime, the demand for general and specialized dental treatment is increasing rapidly, to the utter disregard of an unsympathetic government concerning any dental benefit scheme.

The Australian Society of Orthodontists must decide whether to follow the English pattern wherein the British Society for the Study of Orthodontics has a membership of 99 per cent general practitioners admitted without any orthodontic qualifications, or the American pattern. If Australia follows its usual compromise between the dental systems of the old and new worlds, some form of qualification for certification of orthodontists must come.

Halliday, R. W. 231 Macquarie Street, Sydney, Australia. Some observations on American orthodontics. Austral.D.J. 6:5-7 Feb. 1961



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History

Kalman Klein dental collection

With the assistance of several dental associations, the University of Utrecht, The Netherlands, in cooperation with the Netherlands Society for Promotion of Dentistry, has recently purchased the Kalman Klein dental collection.

This collection consists of an extensive library of rare dental books, several hundred prints and engravings representing dental themes, and old dental instruments. In September 1960, the collection was officially accepted by the University of Utrecht.

Kalman Klein, a Hungarian dentist, entered into partnership with the Dutch "tooth master" Pinkhof of The Hague. After Pinkhof's death, Klein continued his practice. During almost his entire lifetime, he collected old dental books, old dental instruments, etchings, drawings and paintings.

During World War II, Klein was interned as an enemy alien at Vught. During his internment, the collection was carefully preserved at the Netherlands Museum of History of the Exact Sciences in Leiden. Although the museum was damaged in an air raid, the collection remained intact.

Kalman Klein died in 1947, and his collection was more or less forgotten. In 1960, the author contacted Klein's widow in an attempt to preserve the rare collection for the Dutch and the international dental profession. In 1960, the entire collection was bought by the University of Utrecht and the Netherlands Society for the Promotion of Dentistry with funds partially provided by several dental associations and societies.

Unquestionably, the books on dentistry form the most important and most valuable part of the collection. The library contains the following rare works: *Zene Artzney* (published in 1546); Charles Allen's *The Operator for the Teeth* (published in 1686 at Dublin); Campani's *Odontologica* (published in 1786); Bartholomeus Eustachius' *Libellus de Dentibus* (published in 1563 at Venice); a copy of a previously unknown edition of this book (published in 1564) and a copy of the official second edition (published in 1707 in The Netherlands), and Jacob Horst's *De Aureo Dente Maxillary Pueri Silesii* (edited in 1595 and published in 1596). The famous French dental literature of the eighteenth century is almost completely represented, including all editions of Fauchard's works. Altogether, there are about 1,000 rare dental books, published in the period from 1546 to 1885.

The art collection contains about 250 dental prints, engravings, etchings and paintings.

The collection of dental instruments consists of pelicans, tooth keys, early forceps and a showcase containing samples of artificial teeth, among them those made by Fonzi in 1808. There are instruments for removal of calculus and for preservation of teeth, constructed in the time of the French Empire. The finest instrument case of the collection belonged to Maria Theresa, Empress of Austria (1717-1780). All instruments bear her initials. A memoir of Calembrun Mercure, dentist to the Austrian imperial court, is added, dated 1828.

There are also many other curiosa, such as a Dresden china group representing a tooth extraction, several china plates, pipe bowls, tobacco boxes and coins showing dental pictures, and badges and medals of dentists.

de Maar, F. E. R. Stadhouderslaan 10, The Hague, The Netherlands. De collectie Kalman Klein. Nederlands Tandarts. 15:277-284 Oct. 1960

Fluoridation recommended one hundred years ago

The "biological age" in dentistry was initiated by two nondental scientists who performed research work independently of each other. In 1736, Anders Adolf Retzius, a Swedish anatomist, wrote *Microscopiska undersökninger öfver tändernas, särdeleses tandbenets strutur* (Microscopic studies of tooth structures, especially dentin). In the same year, Johannes Evangelista Ritter von Purkinje, a Czech physiologist, published *Über die röhrige Bildung der Zähne nebst dazugehörende Präparate* (Tubular formation of teeth, demonstrated in specimens). Von Purkinje's pupils, Meyer Fraenkel and Isaac Raschkov, wrote their doctoral dissertations on the same subject in 1835.

In 1683, Antoni van Leeuwenhoek, a Dutch microscopist, discovered under his self-made

microscopes characteristic fibers, fibrils and tubules in human teeth. He described and pictured the hard tooth substances in *Microscopic observations of the structure of teeth and other bones.* Unquestionably, this was an important histological discovery, because prior to van Leeuwenhoek it was assumed that human teeth consisted of a structureless substance. None of his contemporaries considered van Leeuwenhoek's microscopic evidence of the complicated structure of the ground substance in human teeth as more than an undemonstrable theory having hardly any practical significance. Van Leeuwenhoek's discovery was soon forgotten.

The research results obtained by Retzius and von Purkinje, however, soon found practical application in the then beginning scientific dentistry. Their conclusions were reported in an anonymous article *Aus der Natur,* published in 1866. One chapter, *"Woher stammen die schlechten Zähne?"* (Where are the decayed teeth coming from?), recommended fluoridation as a means of reducing the incidence of dental caries. The article first described the "three hard tooth substances of the developing tooth," dentin (a term created by von Purkinje), cementum and enamel. After describing the composition and structure of human teeth and their resistance to damaging chemical and physical influences, the author devoted the main part of the article to the development and course of dental caries, then called "tooth corrosion" or "tooth putrefaction."

He advised the general public on proper dental and oral hygiene, and emphasized that an increase in the incidence of caries always is associated with a regional lack of fluorine in the form of calcium fluoride (CaF_2). He stated that the main constituent of a human tooth is calcium phosphate $Ca_3(PO_4)$ 2. Regional lack of calcium fluoride and individual deficiency of this compound in teeth and bones are associated with an inadequacy in the calcium and fluoride contents of the arable soil. He recommended immediate enrichment of the soil by adding calcium fluoride to fertilizers. He closed the argument by stating that human teeth excavated from ancient tombs and graves contain a far higher amount of calcium fluoride than the teeth of the present generation.

Evidence that fluoridation is an effective means to obtain resistance to caries, therefore, can be found not only in the recent literature. It is important that our generation use this caries-reducing procedure instead of neglecting it as it did in the nineteenth century.

Proskauer, Curt. School of Dental and Oral Surgery, Columbia University, 630 West 168th Street, New York 32, N.Y. Fluoridierung wurde bereits vor hundert Jahren empfohlen. Zahnärztl.Mitt. 48/50:975 Nov. 1, 1960.

Organization

Dues and membership in scientific societies

For over 100 years the scientific societies of the United States have provided the principal means of communication among American scientists. In the late 1800's the first of the newly formed societies brought small groups of specialists together, usually on a local basis, for the exchange of research ideas and results. As membership increased and became national and even international, the society journals appeared. Regular annual meetings for the oral presentation of research results were soon established and quickly became traditional.

In recent years, the increasing number of research papers offered to society journals for publication, together with other pressures, have forced professional societies to reconsider their role and their methods of providing scientists with avenues of communication. The Office of Science Information Service of the National Science Foundation in July 1959 sent a brief questionnaire to the secretaries of 215 professional scientific societies. This is the report of that survey, and is based on 177 returned questionnaires. (Societies in clinical medicine, dentistry, applied technology, Greek-letter and honorary societies and regional or state organizations were not included in the survey.)

Membership in individual societies ranged from less than 100 to more than 87,000. For analytical purposes, societies were grouped into seven major disciplines plus a miscellaneous category, the disciplines being engineering (35 so-

cieties), chemistry (10), biology (67), social science (22), physics (12), earth science (12), mathematics (8), and miscellaneous (11). The 35 engineering societies had an average membership of 14,822 each.

Most societies offer scientists a choice of membership, commonly including senior or active membership, junior or student membership, and institutional (corporate, contributing, or sustaining) membership.

The oldest society in the study was 160 years old and the youngest, one year old. Of the 176 societies analyzed for age, 8 were founded between 1799 and 1860; 8 from 1861 to 1880; 26 from 1881 to 1900; 46 from 1901 to 1920; 39 from 1921 to 1940, and 49 from 1941 to 1959. No significant correlation was found between the ages of societies and their total membership, or between the age of a society and the annual dues paid by senior members.

Annual society dues varied from an average of $6.00 for societies in the discipline of biology (median salary level of $6,789) to $15.00 for engineering societies (median salary level of $9,065).

Senior members contributed the highest percentage of total income from annual dues, the percentages ranging from 69 per cent in chemistry to 91 per cent in biology. Institutional members also provided a substantial proportion of the income from dues, and all disciplines (but not all societies) had this category of membership. The average income from this source for all disciplines was 17 per cent. The average total income that each society derived from annual dues (all categories) ranged from $12,800 per society in biology to $234,200 in engineering. Sixty societies reported that their sole source of income was from dues.

At least 66 per cent of all societies had sources of income other than dues; percentages ranged from 50 per cent for physics societies to 86 per cent for the societies in social science. Other sources of income included contributions, endowments, sale of lists, books, reprints, annual meeting registration fees and exhibit space rental, investments, and advertising.

More than 86 per cent of the 177 societies published at least one scientific journal as part of their service to members. Sixty-seven per cent of the societies indicated that their members received at least one journal free of charge with the payment of dues. About 19 per cent of the societies had more than one scientific publication, and members might be charged for all or none. Twenty-nine societies published no research journal.

Individual journal circulation ranged from a low of 250 to a high of 85,000.

Ninety-four per cent of the societies surveyed sponsored annual meetings at which original research papers were presented. About 70 per cent of the societies indicated that at least some of these papers were published subsequently either in the society journal or in some other appropriate publication.

During the period 1937 to 1959 all disciplines experienced a substantial increase in society membership, chemistry and engineering societies quadrupling their memberships in that period.

The dues paid by senior members increased in all disciplines during the period 1937 to 1959.

The average dollar cost of journals to members followed a pattern similar to that of dues—a slight rise during the period from 1937 to 1948 and an abrupt rise from 1948 to 1959, the increases ranging from 64 per cent to 356 per cent.

The National Science Foundation has undertaken a separate, comprehensive survey of research journals, and a report can be expected in early 1961.

Stewart, Ileen E., and McGurl, Vincent W. Office of Science Information, National Science Foundation, Washington, D.C. Dues and membership in scientific societies. Science 132:939-942 Oct. 7, 1960

Miscellaneous

Survey of Dentistry report on dental hygienists

To obtain information about the present status and attitudes of dental hygienists, the Commission on the Survey of Dentistry mailed a questionnaire to 20,600 hygienists. Replies were received from 7,758.

Of those responding, three-fourths were married, about one-fifth were single, and 5.7 per cent

were widowed, divorced or separated. Forty-six per cent of respondents employed full-time in dental hygiene were single; 44 per cent were married. Of 3,606 respondents who were not employed in any occupation or who did not report their employment status, 2 per cent were single and almost 96 per cent were married.

Of the respondents, 4,332 (56.2 per cent) indicated that they had children under 18 years of age.

Of 7,758 respondents, 7,417 were graduated from a dental hygiene school and most had attended a course one to two years long.

Almost half of the respondents were under 30 years old, and almost three-fourths were under 40 years old, but of 769 hygienists that were 50 years old or older, 51 were over age 65.

Most of the hygienists (69.2 per cent) had ten years of work experience or less. Of the respondents currently licensed, 2,260 (30.2 per cent) were licensed to practice in two states.

Only 3,784 hygienists (48.8 per cent) were employed either full-time or part-time. Of those not employed, 3,080 were not seeking employment in dental hygiene; 3,010 said they had full-time family obligations.

Asked their reasons for becoming a dental hygienist, 1,187 said they had been a dental assistant and liked it; 751 mentioned the influence of a family dentist.

About 57.4 per cent of the respondents were not members of the American Dental Hygienists' Association; one-third said they had been members at one time; 60 per cent of hygienists employed on a full-time basis were members, whereas only 40 per cent of part-time workers reported membership in the association.

About 58.4 per cent of dental hygienists reported working on a straight salary basis; 25.6 per cent received commissions only, and another 12.2 per cent received both salary and commissions. Annual salaries for hygienists, including both full-time and part-time, ranged from less than $1,000 per year for 2.7 per cent to over $8,000 for 2.2 per cent; 58.5 per cent earned salaries in the range from $3,000 to $6,000 before deductions. Of the 3,784 employed hygienists, about half (56.4 per cent) worked 35 hours a week or more. Most hygienists reported receiving a paid vacation; 28.4 per cent received two weeks; 6.4 per cent received one week; 3.3 per cent received ten weeks or more; 33.8 per cent said they received no paid vacation.

Some 72.0 per cent of hygienists were employed by dentists in private practice; 21.4 per cent worked for two dentists.

Of 3,784 hygienists employed, 34.3 per cent said they performed duties usually delegated to a dental assistant; 27.4 per cent did chairside assisting, 30.9 per cent spent time on receptionist duties, and 22.9 per cent performed bookkeeping duties.

Of 2,160 hygienists working 35 hours per week or more, 22.7 per cent performed 40 to 49 prophylaxes per week. Some 62.5 per cent of the respondents said they devoted less than 30 per cent of their time to instructing patients in correct diet and oral hygiene habits.

Asked to state what improvements they would like to see in the education of hygienists, 980 mentioned more clinical experience and practical training, and 539 said they thought the course of training should be lengthened to four years; 618 said the practice of dental hygiene could be improved if state reciprocity arrangements were changed to permit licenses to be more readily obtainable.

The Commission recommends that the dental profession initiate studies designed to develop and expand the duties of auxiliary personnel. The broadening of the services should begin with the dental hygienists because for this group there already is an established program of education and licensure.

Kesel, Robert G., and Holmquist, Marilyn. 808 South Wood Street, Chicago, Ill. Survey of Dentistry report on dental hygienists. J.Am.D.Hygienists' A. 35:9-20 Jan. 1961

An inservice program on dental health

Public health nurses are in a unique position to further the cause of dental health. In their role as family health teacher, they meet expectant mothers, infants, preschool children, adolescents and adults. When nurses on the staff of the Yonkers Department of Public Health expressed a need for greater understanding and knowledge of dental health, a committee was formed to plan

an inservice course on modern dental health care. The committee consisted of nurses, a staff dental hygienist, a New York State Health Department supervising dental hygienist, and two staff dentists. A suggested dental health education program for basic nursing students, as outlined by Aaron Markowitz (1959), aided the committee. Objectives of the staff education program were:

1. To stimulate interest in dental health and dental health education.

2. To impart the knowledge of dental health needed by the nurses to integrate dental health into total health teaching.

3. To assist nurses in their interpretation of problems related to dental health care.

4. To provide skills and technics in fostering better attitudes toward dental care.

5. To improve understanding of the preventive aspects of dental care.

6. To provide a better understanding of the economics of dental care.

7. To provide practical applications of dental health concepts in public health nursing.

The local dental society supplied teachers. The subjects in the course outlined included an introduction, pedodontics, nutrition, orthodontics, cleft palate and cleft lip repair, dental health, oral medicine, periodontics, oral surgery, oral pathology, fluoridation and prosthodontics. Each dentist-teacher used illustrative slides and dental models to demonstrate his subject.

The nurses enjoyed the course and found the information gained of practical help in their work. All the teaching sessions were tape recorded, and nurses who missed a session could listen to the recorded lecture they had missed. Future programs will include a session on oral anatomy and physiology, will emphasize the responsibilities of the nurse in dental health programs, and will include more information on the dental needs of the indigent patient. It is hoped to induce nursing schools to include in their curriculums information on the preventive aspects of dental health programs.

Rosenberg, Arnold, and Drew, Dorothy M. 20 South Broadway, Yonkers, N.Y. An inservice program on dental health. Nursing Outlook 9:85-87 Feb. 1961

Syndromes

Though the word "syndrome" has been used in English at least since 1541, and is defined by the *New English Dictionary* as "a concurrence of several symptoms in a disease" or "a set of such concurrent symptoms," nowadays it is also applied to collections of signs, to mixed collections of symptoms and signs, and sometimes to a disease entity. It may even apply to special clinical test findings, or to a specific laboratory finding.

Among the values and uses of the syndrome are that it: (1) enables us to celebrate the great observers, (2) provides a framework for learning clinical skill, and (3) illustrates the system of medical logic.

The syndrome represents an unconscious medical logical system. It is the algebraic formula in medicine. Symptoms are symbols of disordered functions. The development of these symptoms provides other symbols. Symptoms and their evolution are associated with physical signs, which also are symbols. Special tests provide additional symbols.

If the patient has all the ingredients of the formula, there will be no doubt about the diagnosis. Patients hardly ever have all the ingredients at the early stage. The patient may have some of them, but may lack one or more of the cardinal ones. The physician or dentist then has to make his diagnostic graph of the equation by choosing the points which best suit his notion of the case. The fewer correct points there are, the more speculative the graph becomes. The graph eventually may diverge so much from what it should be that another outline may appear, resembling the graph of a different disease.

This system of medicine which we all use, and which the student has to learn, is of great practical value and is as "scientific" as any other method of science.

The syndrome represents the culmination of medical endeavor, for a syndrome comprises all those features by which a disease is described, and embodies the distilled or abstracted knowledge of the total experience of the medical and other, allied, scientific professions.

Syndromes are the signpost and compass and map which direct us through the crowded twisting streets, the oceans, and the jungles of medical

experience. They are not points of arrival, or things. They are not immutable, and always are to be reviewed critically. A full understanding of the logical system implied by the syndrome should enable us to guide our patients with confidence and wisdom; should suggest and direct our researches, and should refresh our sense of gratitude to our medical forefathers.

Gooddy, William. National Hospital, Queen Square, London, England. Syndromes. Lancet No. 7167:1-3 Jan. 7, 1961

Dental health inspection in the schools

The objectives of a dental health program in schools are:

1. To help every child appreciate the importance of a healthy mouth throughout the life span.

2. To establish an understanding of the relation between dental health and general health.

3. To encourage the observance of dental health practices including personal care, professional care, proper diet and good masticatory habits.

4. To enlist the aid of all groups and agencies interested in the promotion of child health.

5. To correlate dental health activities with all generalized health programs.

6. To stimulate the development of resources for making dental care available to all children.

7. To enlist all dentists in providing dental health services for children.

A good dental health program in a school system will cover dental health services, dental health instruction, and concern for dental health treatment on the community level.

The dental health inspection should not be conducted as a diagnostic means but rather as a cursory inspection of the mouth and teeth of each child. During the inspection the child should learn the general condition of his dental health and the reasons for the procedures which are to follow; namely, visits to the dentist, dental treatment, instruction on when and how to brush the teeth and the need to restrict sugars in the diet for the purpose of controlling caries.

The dental inspection serves as a basis for the school dental health education efforts. It builds a positive attitude toward the dentist and dental care, and motivates the child and his parents to seek and to accept dental treatment as a part of total health protection. Teachers, dentists and others concerned with the dental health of children use the inspection as a fact-finding instrument.

Children should acquire early in life the habit of expecting regular dental treatment. If school inspections are conducted properly, this desirable health habit will be developed by personal initiative based on the desire of most parents to do what is best for their children. The child desiring to be accepted by his group accepts his responsibility for dental care in an effort to attain good health as part of his physical and intellectual development.

Stoll, Frances A. School of Dental and Oral Surgery, Columbia University, New York, N.Y. Dental health inspection in the schools. J.School Health 31:55-58 Feb. 1961

The dentist and the cardiac patient

Because the dentist may be confronted with problems related to the patient's heart, the dentist should inquire specifically about that organ in the course of taking an initial history of the patient.

Arteriosclerotic and hypertensive heart conditions are the most common types found in the population of the United States.

In the patient with significant hypertension, simple sedation no longer is the choice of treatment. Currently used antihypertensive drugs can cause a variety of systemic changes; the effect on blood pressure and pulse rate are the ones that are most important for the dentist. A patient on a ganglionic blocking drug may have been taught always to assume the erect position gradually, to allow muscle tone and its pumping action to prevent pooling of blood in the legs and ensuing hypotension. However, such a patient loses this control in the dental chair. If, after a procedure of some duration with the patient in a semi-reclining position, the dentist suddenly tilts the patient upright, an undesirable gravitational effect could occur, and hypotension could lead to loss of con-

sciousness, permanent brain damage or myocardial injury.

Patients can minimize the likelihood of an anginal attack during dental treatment. They should arrange to come to the office when they have adequate time. They should not be too hurried to allow time for anesthesia. The appointment should not follow a heavy meal. They should allow time for mild sedation if there is anxiety associated with the anticipated procedure. Diphenhydramine hydrochloride in doses of 25 or 50 mg. has an excellent sedative effect with virtually no adverse reactions.

Wherever possible, local anesthesia is desirable in patients with heart disease. The amount of epinephrine in the standard injectable local anesthetic is of no consequence as long as the injection is made outside the blood vessels.

If the dentist learns a patient has had a myocardial infarction, all elective dental procedures should be postponed for six months, after which the dentist can proceed as though the patient has angina pectoris, even in the absence of clinical angina.

Each dental patient undergoing anticoagulant therapy should be discussed with the responsible physician concerning the procedure to be followed during dental therapy.

Sperber, Robert J. 140 Lockwood Avenue, New Rochelle, N.Y. The dentist and the cardiac patient. New York State D.J. 27:67-70 Feb. 1961

Practice administration

'Human factors' research program

For more than two years, a study called "Human Factors (HF) Research" has been underway at the University of Southern California, to investigate the environment of persons involved in dental procedures. A team approach has been applied to the investigation of these persons, the dental office layout, the instrumentation and the dentist's skills. Aid has come from persons in the fields of applied psychology, physical education, business administration, design and architecture.

HF researchers have met once a week since the inception of the project. With support from the manufacturers of dental equipment, a unique laboratory has been created, with $50,000 worth of modern dental equipment representing three different manufacturing concepts and arranged in three different plans. The walls of the laboratory layout can be moved or removed and the entire setup revamped for the development of new considerations and concepts. Working under Robert W. McNulty, dean of the School of Dentistry, are four principal investigators: Rex Ingraham, professor of operative dentistry; Rene L. Eidsen, associate professor of operative dentistry; Henry M. Tanner, professor of fixed prosthodontics, and Sanford Golden, assistant professor and a consultant to the dental equipment industry.

Dr. Golden recently observed: "As long ago as 20 years, public funds were set aside for the study of fatigue in truck drivers. But . . . there has been no such expenditure of public funds for similar studies on dentists, physicians—or editors. . . . Money must be made available for research which will help our professional people to be more efficient, encourage better doctor-patient relationships, and in the long run prevent dentists from killing themselves with overwork."

Three architects, a designer and a consultant built a scale model of a dentist's office before they undertook the laboratory with the movable walls.

The project has stimulated a handbook on body mechanics for dentists, now in preparation. In a physical study of the dentist in his work, involving more than 200 dentists, stress and fatigue are being studied. With the aid of a clinical psychologist, a questionnaire is being planned to ask dentists about their work. To summarize its work, the HF project has made two motion pictures; the first shows a junior dental student working in conventional surroundings, the second film shows the student working in the modern environment being studied.

305 Selling Building, Portland 5, Ore. 'Human factors' research program. Oregon D.J. 30:4-6 Dec. 1960

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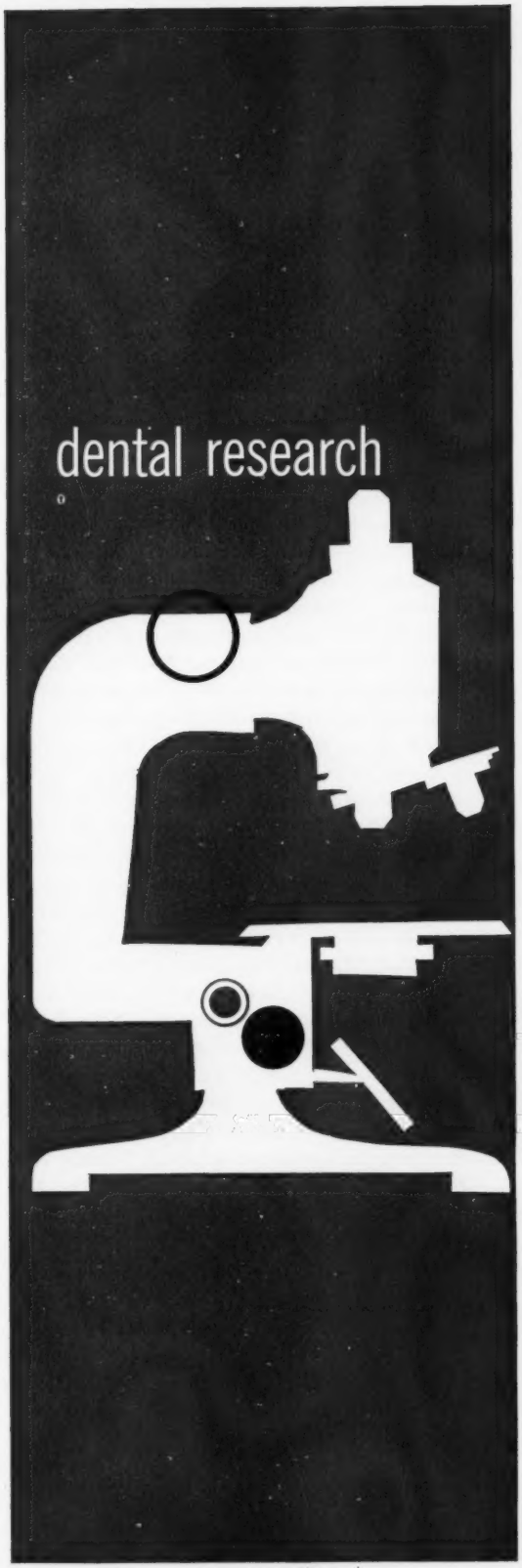

Caries etiology and control

Effectiveness of topical stannous fluoride applications in a pedodontic practice

This study was undertaken to evaluate the effectiveness of a stannous fluoride topical application each six months for a three year period. The subjects consisted of 350 children, ranging in age from 3 to 15 years, selected at random from patients seen in a pedodontic practice in Muncie, Ind.

Each child received topical applications of an 8 per cent solution of stannous fluoride, according to the technic described by Muhler (1958), at the beginning of the test period and each six months thereafter. In addition, the children received normal restorative dental treatment.

The children were divided into three classes representing different orders of caries susceptibility. Group I consisted of 129 patients who at the initial examination had 1,378 DMF teeth, the mean number of surfaces being 10.68. Group II was comprised of 66 patients with 905 DMF surfaces, with a mean of 13.70, and Group III consisted of 127 patients with 2,034 DMF surfaces or a mean of 15.80.

The 129 children in Group I had no new carious surfaces when re-examined at 18 and 36 months. The 66 children in Group II had 227 new carious surfaces after 18 months, but no further new carious surfaces after 36 months. The 127 patients in Group III had 196 new carious surfaces after 18 months and 551 after 36 months.

The data demonstrate the anticariogenic effect of stannous fluoride when reapplied topically each six months under normal conditions existing in a practice limited to pedodontics.

There is clinical evidence to support the belief that a child with a low susceptibility to caries can be treated with a practical preventive dentistry program in such a manner as to eliminate new caries almost completely. Such a program includes good operative dentistry, practical advice on nutrition, good oral hygiene and topical stannous fluoride therapy.

Rothhaar, Raymond E. Johnson Building, Muncie, Ind. Topical stannous fluoride in a pedodontic practice. J.Den.Children 27:140-142 July 1960

In vivo and in vitro studies of dental caries

Recent in vivo studies of the etiology of dental caries confirmed the results of in vitro investigations reported in 1946.

The decalcification process precedes the bacterial invasion and action by a significant period of time. The in vivo studies also demonstrated that a characteristic disintegration (cavity formation) in the cementum occurs, a phenomenon which has not been observed in the in vitro investigations.

Exposure and putrefactive decomposition of the pulp, however, occur at a relatively late stage of the carious process, even if the dentin covering the pulp chamber shows the effect of the bacterial action. Microbial invasion also occurs beyond the recognizable carious lesions, especially in the region of gangrenous roots which exhibit no signs of caries but a deep necrotic infection or an inflammatory reaction, especially observable in the spiral canaliculi of the dentin.

The experimental medium used to produce carious lesions consisted of carbohydrates (mainly bread paste) and saliva. After the cariogenic action of the medium on fissures, pits and smooth surfaces of the teeth had been demonstrated, smears of the medium were collected and examined under the microscope. The specimens contained a characteristic culture of specific parasitic and saprophytic fungi which had caused mold formation. There was no evidence of the presence of the usual bacterial contents of the human flora. In most of the specimens, a gram-positive microorganism was detected which was characterized by extremely long filaments, resembling the threadlike processes of the odontoblasts. The cariogenic medium appeared to be penetrated by yeastlike fungi.

Several dentin specimens were decalcified by lactic acid, and cleansed for 24 hours in running tap water. These specimens were kept for two years in a periodically renewed putrefactive solution. After this time, neither the signs of bacterial action nor those of molecular decomposition—characteristic for the presence of caries—were observable.

In teeth in which an experimental cavity had been prepared, sufficiently deep to reach to the

dentinoenamel junction, a gradual decalcification of dentin occurred after the teeth remained in the putrefactive solution for four months. In these teeth, the localized, progressive and molecular disintegration of the hard tooth substances became more evident when the solution contained unrefined or vegetable monosaccharides or disaccharides. This disintegration was obviously caused by the enzymic action of oral bacteria. In these tooth specimens, there was an increased bacterial invasion observable, especially in the dentin canaliculi, and an increased production of acids associated with an increased decomposition of the inorganic constituents of enamel and dentin —a series of phenomena which are hardly observable in the human mouth.

In all the studies carried out, however, there appeared a complete lack of the second phase of the chemicoparasitic theory of the etiology of caries (the removal of the organic matrix by proteolysis). Until now, this phase had been considered as the primary feature of caries in the living human organism.

Hoffer, O., and Fasoli, G. Dental School, University of Milan, Via Commenda 12, Milan, Italy. Die Karies im lebendigen Organismus und in vitro. Deut. Zahnärztebl. 14:599-602 Oct. 8, 1960

Enamel demineralization

The material consisted of 60 extracted human teeth, all of which were caries-free or had only small pits of decay. Roots were covered with acrylic resin, leaving only intact enamel surfaces exposed. The teeth were divided into six groups, and ten teeth were suspended in each of six beakers and covered with 250 ml. of one of six different solutions, as follows: 0.1 per cent lactic acid, buffered with dilute sodium hydroxide to pH 4; the same, buffered to pH 5; the same, buffered to pH 6; 0.1 per cent succinic acid, also buffered to pH 4, 5 and 6 with dilute sodium hydroxide. Beakers, solutions and teeth were placed in an incubator set at 37°C. Every 24 hours the solutions were renewed. Each day's poured-off solutions were saved, the six collections were evaporated, ashed, and a third of each batch of ash analyzed for calcium, a third for phosphorus and a third for magnesium.

Succinic acid at each pH is much more active than lactic acid in dissolving enamel. In this experiment, succinic acid removed up to five times as much calcium and phosphorus as lactic acid, and up to 20 times as much magnesium.

More intensive study of the demineralization role of the dibasic acids is needed. Although lactic acid has been widely suspected as the chief causative agent in demineralization leading to dental caries, apparently succinic acid is much more active in dissolving the enamel.

Wynn, Winfrey; Haldi, John, and Law, M. L. School of Dentistry, Atlanta-Southern Dental College, Emory University, Atlanta, Ga. Enamel demineralization. D.Progress 1:4-7 Oct. 1960

Phosphorus and calcium supplements to bread diets reduce caries in rats

A diet composed of dry bread, glucose and essential vitamins resulted in extensive dental caries in Sprague Dawley rats.

Bread prepared with a flour which contained 1.0 per cent of disodium hydrogen phosphate—Na_2HPO_4—resulted in a 51.0 per cent reduction in the incidence of caries and an 83.0 per cent reduction in the severity of caries.

Use of bread flour containing 1.0 per cent diammonium hydrogen phosphate—$(NH_4)_2HPO_4$—resulted in a 72.0 per cent reduction in the incidence of caries and a 93.0 per cent reduction in the severity score. These two phosphates also inhibited caries significantly when added directly to bread diets.

Monobasic calcium phosphate hydrate—$Ca(H_2PO_4)_2 \cdot H_2O$—at a level of 1.75 per cent in the bread flour, and 1.5 per cent tribasic calcium phosphate—$Ca_3(PO_4)_2$—in the bread-glucose diet, also inhibited dental caries significantly.

In two trials, 1.41 per cent of sodium phytate added to the bread-glucose diet reduced the incidence of caries 77.0 per cent and reduced the caries severity score by an average of 91.0 per cent.

Calcium lactate added to bread flour was anticariogenic, but calcium gluconate had no anticaries effect. Limited studies with these materials indicate that not all calcium supplements may be cariostatic.

The results add to previous evidence of a significant cariostatic effect of a phosphated bread and a phosphate supplement added to a bread-glucose cariogenic diet.

McClure, F. J. National Institute of Dental Research, Bethesda, Md. The cariostatic effect in white rats of phosphorus and calcium supplements added to the flour of bread formulas and to bread diets. J.Nutrition 72:131-136 Oct. 1960

Physiology

Recent concepts on connective tissue

To both the dental practitioner and dental researcher, connective tissues are of great interest, because they play an important role in tooth development and eruption, oral inflammation, systemic disturbances and the formation of periodontal pockets.

Connective tissue consists of three main elements: cells, fibers and ground substance. Quantitative and qualitative differences among these three elements give rise to the varieties of connective tissue, such as fibrous connective tissue, bone and dentin.

The fibroblast, the osteoblast and the chondroblast are believed to be instrumental in the production of collagen and of the ground substance mucopolysaccharides. The available evidence suggests that these substances are delivered by the cell in a precursor form, which then undergoes changes in the intercellular spaces. The nature of the precursors delivered by the cell is a matter of speculation.

Of the three recognized collagen fractions—neutral salt extractable collagen, acid citrate extractable collagen, and insoluble collagen—the latter two fractions appear to be of fibrillar origin, whereas the first is believed to be of extrafibrillar origin. Neutral salt extractable collagen is considered to be the in vivo precursor of the collagen fibril. Environmental factors such as pH, ionic strength, negatively charged macromolecules and temperature are instrumental in the formation and structure of the fibril. It is believed that the changes the neutral salt extractable collagen undergoes during the in vivo fibril formation—and thus during its conversion to acid citrate extractable and to insoluble collagen—may be associated with a change in its state of aggregation resulting from the formation of increasingly more numerous and stronger interparticle crosslinks. This suggestion is consistent with the close similarity in the chemical properties of the various collagen fractions, with the differences in their solubility, and with the observation that typical collagen fibrils can be reconstructed in vitro from all collagen fractions. There is evidence to suggest also that changes in the associated cementum substance are involved during the formation and growth of the fibrils. These changes may be closely related to the conversion of reticular fibers to collagenous fibers.

The ground substance is not a uniform chemical substance but is made up of a variety of components of diverse origins. The greatest proportion of connective tissue, polysaccharides, appears to be free of uronic acid. The components of the ground substance play important roles in water binding, in the distribution and storage of extracellular cations, in detoxification mechanisms, in the properties of the collagenous fiber, and possibly in fibrillogenesis.

The fact that nutrients from the blood and metabolic products from the cells must pass through connective tissue emphasizes the importance of this tissue in health and disease.

The article lists 136 bibliographic references.

Krikos, George A. School of Dentistry, University of Pennsylvania, Philadelphia 4, Pa. Recent concepts on connective tissue. J.D.Med. 16:3-15 Jan. 1961

Masseteric reflexes in patients with trigeminal neuralgia after neurotomy

The re-inducing of the involuntary activity (reflexes) of the masseter muscle was investigated electromyographically in 20 patients who had undergone retrogasserian neurotomy to eliminate the pain occurring along the course of the trigeminal nerve caused by trigeminal neuralgia.

In eight patients, the surgical division of the posterior root of the gasserian ganglion did not result in impairment of the trigeminal nerve or its branches. In those patients, almost normal reflexes

of the masseter muscle were demonstrable, whereas in five patients a slight affection of the motoricity of the nerve had occurred on the side of the face on which the operation was performed, and a significant decrease in the reflex responses of the masseter muscle was observable. In the other seven patients, the impairment of the trigeminal nerve and of several (especially the motor) branches was pronounced; the reflex responses of the masseter muscle were unobtainable even preoperatively.

The fact that in 13 patients the masseteric reflex responses could be obtained postoperatively proves that the conductive path of the masseteric reflexes does not pass through the sensory branches of the trigeminal nerve (as has been previously assumed) but through its motor branches.

The electromyographic investigation proved also that in instances in which the proprioceptive activity of the muscular spindles remained intact after retrogasserian neurotomy, complete coordination of all muscles of mastication can be reestablished. This holds true even in instances in which the sensory innervation of the maxillofacial region was eliminated or significantly reduced by the surgical intervention.

Vyklický, L., and Káclová, J. Fyziologický Ustav, Na Cvicisti 2, Prague 6, Czechoslovakia, Masseterovy reflex po retrogasserské neurotomii. Ceskoslov.stomat. 61:73-79 Jan. 1961

The thromboplastic activity of human saliva

This study was undertaken to determine the effect of saliva in hastening blood coagulation, and to establish the nature of the accelerator factors present in human saliva.

In the determination of the clotting time of whole blood, blood samples from 80 healthy subjects were mixed with whole mixed saliva in different proportions. The ratio of blood to whole mixed saliva used was 4:1, 2:1, and 1:1. Also, the comparative effect of whole mixed, submaxillary, and sublingual salivas on blood clotting tume was studied on 40 healthy subjects using four parts blood and one part saliva. For controls, physiologic saline soluton was substituted for saliva.

The effect of saliva on decreasing blood clotting time is dramatic. The ratio of saliva to blood was not critical in decreasing the clotting time.

One-stage prothrombin, partial thromboplastin, and thromboplastin generation tests were made. It was found that mixed saliva and the pure secretions of parotid, submaxillary and sublingual glands all have thromboplastic activity similar to that found in tissue thromboplastin.

The thromboplastic factors found to exist in saliva include antihemophilic (VIII), Christmas (IX), Stuart (X), P.T.A. (plasma thromboplastin antecedent), Hageman, and a plateletlike activity. Saliva also appears to contain a lipid protein. The inability of salivary fluids to replace adsorbed plasma in the thromboplastin generation test indicates that factor V (labile) is missing in saliva.

These results may have considerable clinical significance. Demonstration of the presence of the different plasma thromboplastic factors in the saliva of normal persons may aid in developing diagnostic tests for patients with blood dyscrasias. The studies also should contribute substantially to an understanding of the conditions influencing the clotting of blood in the oral cavity.

Doku, Hristo Chris. School of Dental Medicine, Tufts University, Boston, Mass. The thromboplastic activity of human saliva. J.D.Res. 39:1210-1221 Nov.-Dec. 1960

Hardness of enamel and dentin

Tooth enamel has the hardness of mild steel. Three distinct methods for the determination of hardness have found application in the dental field. These methods are measurements of resistance to penetration (or scratching), abrasion and elastic deformation.

A review of 62 references in dental literature to the hardness of enamel and dentin leads to the following conclusions:

1. The surface hardness of enamel usually falls in the range of 300 to 400 Knoop Hardness Numbers (KHN), whereas dentin is considerably softer, falling in the range of 60 to 150 KHN, usually in the range of 60 to 80 KHN.

2. No clear effect of age and sex on enamel hardness has been shown. It is doubtful that

either bears any relation to the hardness of enamel.

3. Anterior and posterior teeth and teeth on the right and left sides do not differ significantly in hardness.

4. Considerable controversy exists concerning whether enamel decreases in hardness toward the dentinoenamel junction, but surface enamel certainly appears to be harder than subsurface enamel. Wide variation in hardness exists even between closely adjacent areas of enamel.

5. Caries susceptibility cannot be predicted by the initial hardness of enamel or dentin. However, hardness changes are suitable for the measurement of the progress of natural and artificial carious lesions.

6. Although topical applications of fluorine have been said to increase enamel hardness, subsequent investigations have been unable to reproduce these findings. Topical fluoride treatment does appear to decrease the rate of softening of enamel. Excessively high amounts of fluorine taken systemically during the period of tooth development may decrease the enamel hardness. Teeth from persons in areas with optimal amounts of fluorine do not differ significantly in surface hardness from teeth from persons living in low fluoride areas.

7. Artificially softened enamel apparently can be rehardened in vitro over a period of one to two weeks.

Newbrun, E., and Pigman, W. University of Alabama, Medical Center, Birmingham, Ala. The hardness of enamel and dentine. Austral.D.J. 5:210-217 Aug. 1960

Histology

Study of enamel and dentin in persons of different ages

Comparative investigations of ground sections of teeth of young, middle-aged and aged persons by means of the replica method and electronmicroscopy were carried out at the Dental School of the University of Budapest in cooperation with the Hungarian Academy of Sciences.

All specimens were studied after they had been slightly decalcified. Changes in the enamel occurred at an earlier stage than those occurring in the dentin.

In the permanent teeth of young persons, the hexagonal shape of enamel prisms became evident; the borders of the prisms, however, exhibited wide spaces filled with obviously organic substances.

In the teeth of middle-aged persons, the hexagonal shape of enamel prisms was still observable, but this shape appeared changed in the peripheral layers. This alteration seemed to be caused by an accumulation of calcium oxide crystals and crystallites. The borders of the enamel prisms, therefore, could be examined only after removal of some of these inorganic substances.

Variations in the shape of the enamel prisms, obviously associated with the aging process, were especially observable in the enamel of the cusps in aged persons. Under the electronmicroscope, the organic network could be clearly differentiated inside and outside of the prisms and at their borders. However, no perceivable deviation from normal could be detected in the microstructure of the teeth in these aged persons. The hexagonal crystallic form of the enamel prisms was observable also in the hydroxyapatite.

The vital activity of the ameloblasts seemed to play a more important part in the formation of enamel and dentin than previously assumed. The developing enamel prisms reflected the hexagonal shape of the ameloblast cells in the compact accumulation of crystals toward the periphery of the innermost layer covering the dental papilla.

Under the microscope, the loosely packed central part of the enamel prisms showed some degree of initial calcification. In the teeth of aged persons, the microstructural picture appeared changed by the precipitation of other hexagonally shaped, crystallized inorganic ingredients. Obviously, there were two different mechanisms active (diffusion and osmosis) in decreasing the fluid contents of the organic ingredients. Both mechanisms were obviously associated with the aging process. The microstructure of the teeth in aged persons varied considerably at different sites, even in the same person and the same tooth.

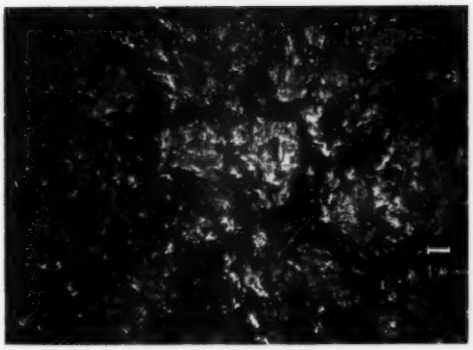

Figure 1 Transverse section of enamel between tooth surface and dentinoenamel junction in a 12 year old boy. The prisms show a hexagonal shape

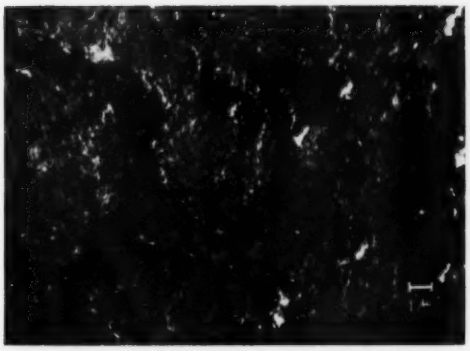

Figure 2 Transverse section of enamel adjacent to the dentinoenamel junction in a 60 year old man. Some of the prisms retained their hexagonal shape

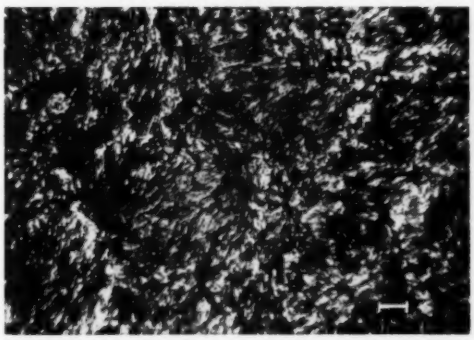

Figure 3 Transverse section of hypercalcified enamel in a 62 year old man. The hexagonal shape of the prisms can be detected only in a few crystallites

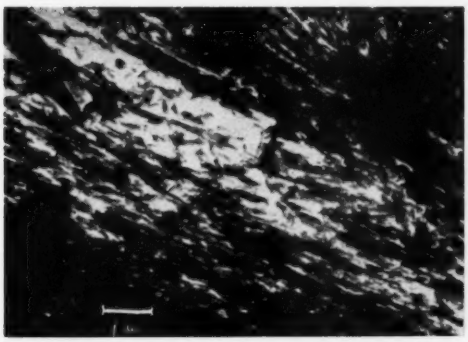

Figure 4 Transverse section of enamel in an 11 year old boy. Crystallites appear positioned at acute angles to the longitudinal axes of the prisms

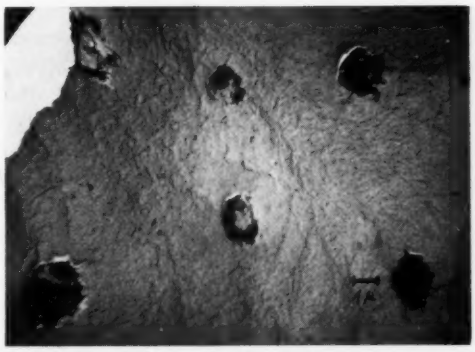

Figure 5 Transverse section of dentin adjacent to the pulp in a 16 year old boy. Numerous fibrils of the intersystem space, zones free from fibrils and the processes of the odontoblasts are clearly observable

Figure 6 Transverse section of dentin in a 60 year old man. The precipitated calcium oxide crystals appear in a granular form. The entire dentin area shows an accumulation of lamellas among the canaliculi

The precipitated calcium oxide crystals accumulated within the network of the organic matrix. Irregularly shaped enamel crystals and crystallites were positioned at different angles to the axes of the enamel prisms.

The results of the investigation of dentin were expressed in terms of Bradford's nomenclature (1951). This terminology describes the in vivo observations more accurately than other vocabulary systems.

Electronmicroscopic studies of the dentin revealed that the intertubular dentin corresponded to an "intersystem space" in which several dentin systems were active. These systems included the odontoblast processes, the surrounding translucent areas and the calcified zones of the dentin adjacent to the enamel. In all in vivo examinations, it was observed that the numerous branching spiral canaliculi of the dentin were occupied by odontoblast processes.

Electronmicroscopic studies of the middle part of the dentin layer showed a pronounced deviation from the original microstructure occurring during the phases of maturation and aging.

In transverse ground sections of dentin from teeth of young persons, layers of fibrous dentin were observable around the dentin systems and the intersystem spaces. This fibrous dentin contained several loose fibrils running in various directions within a seemingly homogeneous matrix.

In the dentin of teeth from aged persons, however, several lamellas appeared among the fibrils, showing a specific granuliform structure.

The processes of the odontoblasts within dentin, running toward the center of the dentin layer, could best be observed in the pseudo-replicas of the permanent teeth of young persons. The calcified translucent zone of dentin, however, limited the area of the canaliculi.

The calcified areas of dentin in the teeth of aged persons showed a specific arrangement of different layers. This continued process may account for the hypersensitivity of dentin observed in aged patients.

Kohári, Stefánia, and Bóna, Katalin. Stomatological Clinic, University of Budapest, Rákószi ut 28, Budapest 7, Hungary. Vergleichende elektronenmikroskopische Untersuchungen von Zahnschmelz und Dentin bei Individuen verschiedenen Alters. Deut. zahnärztl.Zschr. 15:1009-1020 July 15, 1960

Therapeutics

Histamine injections fail to precipitate stomatitic lesions

A study of those factors which can precipitate the characteristic lesions of recurrent ulcerative stomatitis may offer some clues as to etiology. The possibility that histamine might be implicated was studied in ten patients.

No subjective or objective evidence of ulcers could be demonstrated after the submucosal injection of about 0.03 cc. of histamine phosphate in a concentration of 0.001 mg. per cubic centimeter or 0.01 mg. per cubic centimeter, nor did any areas ultimately break down into an ulcer at subsequent follow-up examinations.

It is concluded that histamine release (whether the result of a traumatic or allergic experience) probably does not play a significant role in the production or initiation of recurrent ulcerative stomatitis.

Barbash, Roslyn; Zegarelli, Edward V.; Kutscher, Austin H.; Silvers, Herbert, and Amphlett, James. 630 West 168th Street, New York 32, N.Y. Failure of histamine injections to precipitate lesions of recurrent ulcerative stomatitis. Quart.Nat.D.A. 19:12-14 Oct. 1960

Effect of local application of trypsin on postextraction alveolar osteitis

Several writers have reported that proteolytic enzymes have a beneficial effect on postextraction alveolar osteitis. The present investigation sought to assess the effect of trypsin on the predominant clinical symptom (pain) of postextraction alveolar osteitis. The trypsin preparations used consisted of Trypure dental cones, each containing 5 mg. of crystalline trypsin, and a dental ointment containing 2 per cent crystalline trypsin in a water-soluble base containing polyethylene glycols.

During the year of investigation, 70 instances of alveolar osteitis (1.2 per cent) occurred after extraction of 5,679 teeth. The ages of the 33 men and 37 women patients ranged between 16 and 61 years (mean, 34.5 years). Diagnosis was based on the occurrence of extreme pain,

fetid odor, a necrotic clot, or the absence of a clot in the socket.

Thirty-eight of the 70 patients, selected at random, were treated with trypsin, and the remaining 32 patients served as controls and received a placebo.

The alveolus was rinsed with warm physiologic saline solution, after which a trypsin dental cone or placebo was applied to the alveolus, which then was filled to the brim with trypsin dental ointment or the placebo. The patient was instructed not to rinse the mouth for the next three hours. The treatment was repeated daily until the pain had ceased.

The average duration of pain after the start of treatment was 4.2 days in in the group treated with trypsin and 4.6 days in the group treated with the placebo. The difference (0.4 day) was not significant statistically.

Five (13 per cent) of the 38 patients treated with trypsin developed erosions on the tongue, lips and buccal mucosa. No erosions occurred in the control group. Of the 38 patients treated with trypsin, 28 (74 per cent) complained of a burning sensation after application of the preparation, but none of the patients treated with the placebo made this complaint.

Gustafson, Gunnar, and Wallenius, Kjell. Royal Dental School, Malmö, Sweden. Effect of local application of trypsin on postextraction alveolar osteitis. Oral Surg.,Oral Med. & Oral Path. 14:280-286 March 1961

Role of the enzyme beta-glucuronidase in healing oral wounds

The enzyme beta-glucuronidase is closely related to the cell formation and proliferation of connective tissue ground substance. The part this enzyme plays in the healing process of oral wounds was investigated at the department of pathologic anatomy of the Hospital Ramos Mejia in Buenos Aires, Argentina.

Thirty albino rats received comparatively deep wounds in the palate and tongue, and were sacrificed after three days or one, two or three weeks.

Specimens including the wound and an extensive zone of normal surrounding tissue were removed, and fixed in formaldehyde-chloral hydrate. The presence of the enzyme in these specimens was determined by using the Fishman and Baker's technic on frozen sections with different incubation times.

Beta-glucuronidase causes a positive reaction in the basal layers of the oral mucosa, the epithelium of the skin and in the blood vessels of a normal corium.

Epithelial tissue proliferating over the margins of oral wounds showed an increase in the enzymatic activity. In the specimens obtained in the group of rats sacrificed after three days, the connective tissue exhibited superficial necrotic bands which gave negative reactions. Immediately underlying this negative zone, there was an intensely positive zone, characterized by the presence of an inflammatory exudate containing especially leukocytes.

When the healing of the oral wounds progressed, the fibroplastic proliferation reacted in a moderate but consistent way. The histocytes as well as the giant cells, however, reacted far more intensely.

The results of the investigation seem to support the hypothesis that a definite relation exists between beta-glucuronidase and epithelial proliferation. In the connective tissue, the enzyme appears to be associated with tissue formation and especially with macrophagic function.

Cabrini, R. L., and Carranza, F. A., Jr. Laboratorio de Anatomia Patológica, Hospital Ramos Mejia, Buenos Aires, Argentina. Histochemical localization of beta-glucuronidase in healing oral wounds. Naturwissenschaften 48:131 March 1, 1961 [in English]

Reactions of the human oral flora to two specific antibiotic compounds

The clinical efficacy of two antibiotic compounds, containing either penicillin and sulfathiazole or streptomycin and sulfathiazole, was investigated in vitro at the Dental Clinic of the University of Warsaw, Poland.

Bacterial specimens were obtained from 150 patients with diagnosed oral foci of infection. The collected material contained 150 bacterial strains; there were 50 pure cultures (30 staphylococcal strains and 20 streptococcal strains) and 100 mixed cultures.

These bacterial strains of oral origin were

seeded in Petri dishes containing agar as culture medium and either penicillin with sulfathiazole or streptomycin with sulfathiazole in the form of plates.

The results revealed that both antibiotic compounds obtained a significantly greater effect in inhibiting the growth and the multiplication of the bacteria, as well as in destroying completely the microorganisms, than did the three antibiotics administered separately.

The in vitro investigations showed that in instances of staphylococcal infections in the oral cavity, the drug of choice should be the antibiotic compound containing streptomycin and sulfathiazole (85 per cent sensitivity), whereas in instances of streptococcal infections in the oral cavity, the antibiotic compound containing penicillin and sulfathiazole (70 per cent sensitivity) will obtain the most favorable result.

Danielewiczowa, Kazimiera. Oral Surgical Clinic, University of Warsaw. Miodowa 18, Warsaw, Poland. Reakcjia flory bakterynjnej pochodzenia zebowego na antygiotyki. Czas.stomat. 14:99-105 Feb. 1961

Anesthesiology

Significance of variations of the skull in blocking the maxillary nerve

The deep location of the maxillary nerve makes its anesthetization by regional block difficult and complicated. Before the dentist attempts to block the maxillary nerve, it would be of great value to obtain information concerning the size and shape of the pterygopalatine and inferior orbital fissures and the position of the zygomatic arch. With such data it is easier to select the best route of approach to the maxillary nerve, and thus achieve a high degree of accuracy. Such necessary morphologic landmarks can be provided only by roentgenography. Sweet (1950) first indicated the value of roentgenographic control in blocking the mandibular and maxillary nerves.

The material in this study consisted of 250 dried skulls, including 125 whole skulls, 66 right halves and 59 left halves.

Several extraoral and intraoral approaches to the maxillary nerve have been described by other authors. Observations in this investigation indicate that by the lateral extraoral approach to the maxillary nerve in skulls with a low zygomatic arch, the needle may be passed above the zygomatic arch. This is especially important in those instances in which the pterygomaxillary fissure is short or short and narrow. The authors' material shows that this approach to the maxillary nerve may be used often. The jugal point (the right angle between the upper margin of the zygomatic arch at the posterior border of the orbit) can be used as a landmark for the primary point of insertion of the needle. The inserted needle should be directed horizontally and perpendicularly to the median sagittal plane with a slight forward angulation. After the infratemporal surface of the maxilla is contacted, the needle should be advanced along the bone inward, backward and somewhat upward into the upper part of the pterygopalatine fossa. The depth necessary is about 5.0 to 5.5 cm. Only Waldeyer (1950) has mentioned the route above the zygomatic arch in blocking the mandibular nerve at the foramen ovale.

Before the dentist blocks the maxillary nerve, the bony variations related to this procedure should be checked roentgenographically to select the best route of approach.

Priman, Jacob, and Etter, Lewis E. University of Pittsburgh, School of Medicine, Pittsburgh, Pa. Significance of variations of the skull in blocking the maxillary nerve: an anatomical and radiological study. Anesthesiology 22:42-48 Jan.-Feb. 1961

Methohexital sodium: clinical study of a new intravenous barbiturate anesthetic

Methohexital sodium, a new intravenous barbiturate anesthetic, was used as the prime anesthetic agent for more than 2,500 office oral surgery procedures of all types. The clinical findings were compared with observations in which thiopental sodium was used in 1,000 patients, and in which methitural was used in 500 patients.

The 2,500 patients ranged in age from 4 to 86 years. Procedures varied from single extraction to full-mouth extractions with bimaxillary

alveoplasty. Procedures varied in duration from a few seconds to 80 minutes, but most were less than 5 minutes. Anesthesia was induced with methohexital in about 95 per cent of the patients. In the other 5 per cent, nitrous oxide and oxygen analgesia was employed prior to venipuncture. The barbiturate was administered rapidly with a steady constant pressure on the piston of the syringe, at a rate averaging 1 cc. per 1.5 seconds. Initial dosage was predetermined empirically and depended on such factors as age, sex, body type, psychological evaluation, medical evaluation and anticipated length of the procedure. Immediately on loss of consciousness, a nasal inhaler was applied. For procedures expected to last three minutes or less, 100 per cent oxygen was delivered; for longer procedures, a 50-50 mixture of nitrous oxide and oxygen was employed. Induction requirements of the drug varied from 3 cc. to 20 cc., the average induction dose being 10 cc. of a 2 per cent solution.

The results show methohexital to be about three times as potent as thiopental sodium and five times as potent as methitural.

Induction with methohexital was invariably rapid and pleasant. Recovery time was shorter than with the other two drugs. Only two adult patients had to be transported from the operating room to the recovery room in a wheel chair; all other adult patients were ambulant; in contrast, when thiopental or methitural was used, transportation by wheel chair had to be used for at least 20 per cent of the patients undergoing brief procedures and for almost every patient undergoing prolonged procedures. Complete or almost complete return of alertness in the recovery room occurred rapidly and almost universally after methohexital anesthesia.

However, whereas thiopental anesthesia produces a postoperative euphoria, patients anesthetized with methohexital usually did not have the same pleasant feeling of well-being or euphoria. Frequently, patients would awaken crying.

Respiratory depression and apnea were encountered more frequently on induction and were more pronounced with methohexital than with the thiobarbiturates tested. Systolic hypotension was greatest with methohexital and least with methitural. Twitching of the extremities was noted with disturbing frequency in the first patients who received methohexital, but it was found that the incidence of these twitching episodes could be reduced by decreasing the rate of administration of the induction dosage. Vomiting never occurred in adult patients, and postanesthetic nausea occurred in less than 3 per cent of the patients after methohexital anesthesia. In short, untoward side effects generally were somewhat more frequent and more severe with methohexital.

Because of the remarkable reduction in recovery time afforded with methohexital, the drug appears to be useful in dental office anesthesia for the ambulatory patient.

Recant, Benjamin S. 30-13 Steinway Street, Long Island City, N.Y. Methohexital sodium: clinical study of a new intravenous barbiturate anesthetic. Oral Surg.,Oral Med.& Oral Path. 13:1330-1342 Nov. 1960

Trial of mepivacaine in conservative dentistry

Mepivacaine hydrochloride (Carbocaine), as a 3 per cent solution alone and as a 2 per cent solution with 1:80,000 epinephrine, was compared with 2 per cent lidocaine hydrochloride with 1:80,000 epinephrine, in several hundred dental patients. The dosage was 1 ml. for infiltration anesthesia and 1.5 ml. for regional anesthesia, each by a single injection given at the rate of 1 ml. in 20 seconds. The materials were randomized and coded for double-blind testing. All injections were performed by one operator on patients requiring routine cavity preparation. Patients ranged in age from 11 to 59 years.

No adverse reactions to the agents occurred in infiltration anesthesia. In regional anesthesia, one adverse reaction occurred with each of the three drugs; in each instance, the patient collapsed after the injection, in so-called "adrenalin shock."

There was no significant difference between the drugs either in successful anesthesia or latent period.

For regional anesthesia there was no evidence of any difference in duration. For infiltration anesthesia, 3 per cent mepivacaine had a shorter duration. After infiltration, the duration of soft tissue symptoms was significantly shorter for both forms of mepivacaine than for lidocaine. After

regional injection the soft tissue symptoms were significantly shorter for 3 per cent mepivacaine than for the other two drugs.

Patients reported that their soft tissues felt mainly numb or swollen, and in 85 per cent these symptoms ended gradually rather than suddenly. There was no obvious relation between soft tissue symptoms and any one of the drugs.

Mumford, James M., and Geddes, Ian C. School of Dental Surgery, University of Liverpool, Liverpool 7, England. Trial of Carbocaine in conservative dentistry. Brit.D.J. 110:92-94 Feb. 7, 1961

Intravenous barbiturate anesthesia for dental outpatients

Anesthesia was induced by intravenous barbiturate in 113 dental patients for 417 dental operations performed with the patient in the sitting position. Physiologic monitoring of the pulse, blood pressure and arterial oxygen saturation was performed, with continuous electrocardiogram and electroencephalogram.

Barbiturates in the following concentrations were employed: thiopental sodium, 2.5 per cent, 76 patients, 208 operations; methitural sodium, 3.5 per cent, 24 patients, 82 operations; methohexital sodium, 1 per cent, 36 patients, 127 operations. The intravenous barbiturate was used alone unless special indications arose for supplementation. Sufficient intravenous barbiturate was administered to produce and maintain a stage of unconsciousness, amnesia and analgesia adequate for the performance of dental surgery.

Significant elevation of pulse rates and blood pressure occurred in the majority of patients. In 236 operations on unpremedicated patients, the pulse rate increased from a mean of 80 the day preceding the operation to 97 on the day of operation. For the purpose of evaluation, a pulse rate of over 120 per minute was termed tachycardia. With this criterion, 10.5 per cent of the thiopental group and 3 per cent of the methohexital group showed tachycardia preoperatively. Almost invariably, the induction of anesthesia was followed promptly by a significant rise in pulse rate.

In the 236 operations on unpremedicated patients, the mean systolic blood pressure on the preoperative day was 117 mm. of mercury. The mean preanesthetic systolic blood pressure in this group of patients increased to 127 mm. of mercury.

A significant rise in blood pressure occurred during operation on most patients. In the methohexital group, the mean systolic pressures rose from 129 mm. of mercury preoperatively to a maximum of 156 mm., this peak being reached in 3 minutes. With thiopental, the change in mean pressures was from 126 to 155 mm. of mercury, this peak being reached in 6 minutes.

A comparison of methohexital with thiopental revealed that methohexital was about 2½ times as potent, was equally as rapid in onset of action, and provided a more rapid recovery. The increased incidence of tachycardia, hiccup and muscle tremor with methohexital probably do not outweigh its advantages when used on outpatients with relatively normal cardiovascular status.

A comparison of methitural with thiopental revealed methitural to be less potent, slower in onset, and with no decrease in recovery time. Hiccup and tremor occurred frequently with methitural, but the decreased incidence of tachycardia and hypertension and the absence of laryngospasm were noteworthy.

Early in the study, it became apparent that copious oral secretions constituted a problem. Antisialogogues used were methantheline bromide, hexocyclium methylsulfate, atropine, and scopolamine. Hexocyclium proved to be the most satisfactory antisialogogue of those used.

Christenson, Gilbert R.; Hebert, Clarence L., and Driscoll, Edward J. National Institutes of Health, Bethesda, Md. Intravenous barbiturate anesthesia for dental outpatients. Anesth.& Analg. 40:77-86 Jan.-Feb. 1961

Dental materials

Compressive strength of 'reinforced' silicate cement

The compressive strength of a new, reinforced filling material which contains impregnated glass fibers was compared with that of two conventional silicate cements. In five trials, the average

load at failure was 990 pounds for the reinforced silicate cement, 1,145 pounds for silicate cement A, and 945 pounds for silicate cement B. It seems probable that any enhancement of the compressive strength of silicate cements is likely to result from the incorporation of glass fibers.

For determination of compressive strength, A.D.A. Specification No. 9 (for silicate cement) calls for test cylinders of substances which will not react with the cement. The authors' experience with stainless steel molds lubricated with a 3 per cent solution of a microcrystalline wax in benzene was discouraging. An ideal solution seems to be a stainless steel body containing a Teflon steel lining; cylinders produced in such molds are easily removed and no lubrication is necessary.

McConnell, Duncan, and Brawley, Richard G., Jr. College of Dentistry, Ohio State University, Columbus, Ohio. Compressive strength of 'reinforced' silicate cement. J.Pros.Den. 10:1092-1093 Nov.-Dec. 1960

Epoxy resins as die material

All materials hitherto used for making dental dies have advantages and disadvantages. A new die material made of epoxy resin has been tested as to dimensional stability, surface hardness and strength. Because of its low degree of dimensional changes, its high surface hardness and strength, epoxy resin appears to be a satisfactory material for dental dies.

In tests of dimensional changes, all contraction observed in specimens of epoxy resin occurred within 1 to 3 days after the beginning of the experiment. The average contraction measured was 0.027 per cent.

In tests of surface hardness, epoxy resin was as resistant to cutting as amalgam, and was more resistant than dental stone.

In tests of strength, all the epoxy resin specimens were considerably stronger than specimens made of dental stone.

Epoxy resins have certain disadvantages. The amines used as curing agents for the resin can cause tissue damage and allergic reactions if the epoxy resin is brought into direct contact with the skin or mucosa. With care, such contact can be avoided. The curing agent and the resin should be mixed in a plastic vessel and stirred with a wooden stick. After use, both the plastic vessel and the stick can be discarded.

Another disadvantage of epoxy resin is that it cannot be used in combination with ordinary aqueous impression materials because the presence of moisture prevents polymerization.

Apart from these disadvantages, epoxy resins provide a die material capable of replacing amalgam and plaster of paris in association with waterfree impression materials.

The most suitable composition of epoxy resin appears to be as follows: Five parts by weight of Epicote 815 (Shell Chemical Corp., New York, N.Y.) is mixed with one part of diethylene triamine (DETA). To this mixture aluminum oxide is incorporated in the proportion of 3:4 by weight. This mass is thrown into the mold by centrifugation. To decrease any adhesion of the polymerized model material to the rubber impression, the latter may be coated with a thin film of olive oil or silicon oil.

Östlund, Stig G:son, and Åkesson, Nils Åke. Royal Dental School, Malmö, Sweden. Epoxy resins as die material. Odont.Revy 11:225-234 No. 3, 1960 [in English]

Fractures of cobalt-chromium castings

In a clinical survey of cobalt-chromium partial dentures conducted at the School of Dental Surgery, University of Birmingham, 23 of 160 dentures examined showed a fracture or fractures of the alloy. Twenty-one of the dentures were analyzed metallurgically; 31 sites of fractures were examined, since in some instances more than one fracture occurred in the same denture. The 31 fractures included 19 three-arm clasps, 1 lingual bar, one continuous clasp, 2 lingual plates, 3 occlusal rests, 1 Roach clasp and 4 ring clasps.

Of the 21 castings examined, only 2 showed no evidence of inclusions when viewed at X100 magnification. These two castings, however, showed some gaseous porosity and a large carbide phase. Four castings showed large inclusions of irregular shape, unevenly distributed throughout the specimens, possibly the result of dirt or oxides picked up during melting and casting. The remaining 15 castings showed small inclusions

evenly distributed throughout the specimens.

Shrinkage porosity (interdendritic shrinkage) was seen in four castings. Gaseous porosity was seen in six castings. In 11 of the castings the carbide content was excessive, and in some regions of these castings the carbide phase was massive and continuous. The dendritic pattern of grains was fine in the majority of fracture sites, though a gradation could be observed throughout the clasp sections, consisting of a fine structure in the tips of the arms becoming coarser toward the occlusal rest region.

The fractured castings could be classified into two groups: (1) those with obvious defects in their structures and (2) those with no apparent defect. The structures of the second group of castings appeared normal when examined microscopically. These fractures may have been caused by high stresses, leading either to fatigue failure below the elastic limit of the material or to permanent deformation above the material's ultimate tensile strength.

The distribution of grain size throughout a clasp arm indicates that the tips are likely to be the strongest and the occlusal rest areas the weakest; this was confirmed by the clinical evidence. Hence, it can be assumed that the cause of fracture of many of the clasps that showed no obvious structural defects was that their inherent strength at the point most liable to stress (the point of attachment to the denture base) was insufficient, because of the large grain size normally produced in this region. Photomicrograms of round sections of diameters between 0.05 and 0.15 inch show that castings of 0.05 inch in diameter produce the desirable uniformly equiaxial grains throughout their entire length. It would seem desirable to construct occlusally approaching cast clasps from uniformly round section patterns of a diameter equivalent to British dental gauge 1 (0.05082 inch). Castings of this shape produced under the correct flame melting conditions can be subjected to a considerable amount of bending without any signs of rupture occurring.

All the fractures were transcrystalline and did not follow the grain boundaries. Defects in the structure do not appear to have any influence on the path of the fracture, which intersects the grains whether or not they are homogeneous.

The design of the denture and the method of retention used must be assessed together with the load the individual structures will be expected to bear; these facts must be applied to the physical properties of the alloy used in casting the denture.

Harcourt, H. J. School of Dental Surgery, University of Birmingham, Birmingham 15, England. Fractures of cobalt-chromium castings. Brit.D.J. 110:43-50 Jan. 17, 1961

Miscellaneous

Measurements of subjective reactions: emotion and pain

Measurements of subjective reactions such as emotion (mood) and pain (discomfort, distress and agony) represent an area of significance not only for medicine and dentistry but for the comparatively recently developed science of human behavior.

The science of human behavior, if it is to be soundly established, must move forward from its present state, which in most areas is mainly descriptive and based on the result of one specific measurement. Measurements of subjective reactions depend on the recognition and precise definition of the variables and their relations, and on the development of adequate tools and technics to produce results in quantitative terms.

As in all other sciences, in the field of the science of human behavior, there must be a possibility of prediction. Implicit in this task is the necessity not only to recognize the elements that can be measured but also to understand the existence and nature of the essential safeguards to be kept, the controls to be used and the observations to be made.

One goal of science consists in establishing its guiding principles (rules or laws). The more invariable these principles are, the more favorably will they function. In measuring the sensations of pain and emotion, it is essential to predict from a given situation the particular effect to be expected.

In the complex field of behavioral science in man, most observations and measurements so far have been largely descriptive. Researchers, how-

ever, must not overlook the considerable amount of successful quantitative work performed in psychophysics and psychometry. Stevens (1958) stated: "When description gives way to measurement, calculation replaces debate."

The basic purpose of this study is to demonstrate that only a quantitative approach to subjective sensations (feelings) is rewarding and of practical benefit to medicine and dentistry.

Subjective sensations are often controlling factors in the patient's behavior and as such are elementary factors to be considered in the physician (dentist)-patient relationship.

Beecher, Henry K. Harvard Medical School, Boston, Mass. Measurements of subjective reactions: emotion and pain. Anaesthesist, Berlin 9:333-339 Nov. 1960

Some principles of research design in public health

Research is a systematic activity directed at the discovery of new facts or at the identification of relations among facts. Research attempts to achieve these objectives in a manner that will insure that the data obtained can be applied to a wider range of situations than the one studied, and that the data are not influenced by the bias of the investigator or by any other extraneous factors. The design of research is a technical matter involving technical skills. The principles of research design are as follows:

1. A clear-cut unequivocal definition of the research problem and its relation to the purposes of the program is essential.

2. Review of the relevant literature is always important.

3. The hypotheses, questions, or hunches to be studied should be stated explicitly and operationally to assure that their truth or falsity can in fact be established by the data. Key concepts in the research must be defined clearly.

4. Each hypothesis to be studied must be analyzed into its component parts in order to identify the specific data that will be needed to test it.

5. Methods and technics of research should be selected in accordance with the hypotheses to be tested, the data to be collected, and the purpose to be served by the project. The population to be studied should be identified as clearly as possible. Provision should be made for control groups where it is important to hold constant some factor not under study. The purpose of control in research is to assure that any observed findings are due to a factor that is being studied and are not due to some accidental, unique or extraneous factor.

6. The kind of analysis proposed should be specified during the planning phase and related to the kinds of data anticipated.

7. Materials should be pretested before the study goes into the field, to assure that questions are understood and that they provide the kinds of data needed.

8. The public health researcher will have occasion to use open-minded or free-answer questions with the people he studies. Content analysis often will have to be applied to data obtained in administrative research in public health.

9. Generally, the interpretation of results is reasonably straightforward in definitive studies in which hypotheses have been operationally stated.

Continual review of plans is nearly always required. Not all problems are susceptible to research under the conditions in which they would have to be studied. Much disappointment, time and money can be saved by subjecting research ideas and plans to careful scrutiny for over-all adequacy.

Rosenstock, Irwin M., and Hochbaum, Godfrey M. Research and Development Branch, U.S. Public Health Service, Washington, D.C. Some principles of research design in public health. Am.J.Pub.Health 51:266-277 Feb. 1961

Transplantation of tooth germs

Intact human tooth germs were transplanted experimentally in the same subjects and from one subject to another at the Dental Institute of the University of Milan, in cooperation with the Anatomicopathological Institute of the University of Pavia, Italy.

The behavior of the transplants and their immunity reactions during adaptation were examined under the electron microscope in vivo and in vitro to evaluate the conditions which influ-

enced positively or negatively the possibility of transplant survival and the development of enamel and dentin. The following observations were made:

1. Whole human tooth germs survived transplantation if the ameloblasts remained uninjured and were able to participate in the elaboration of the enamel prisms.

2. When, after transplantation of tooth germs, the ameloblasts appeared to be separated from the odontoblasts, new enamel was formed almost normally, and the outer surface of the pulp as well as the dentin developed undisturbed.

3. Degeneration of the ameloblasts in the transplanted tooth germs resulted in the formation of specific cords of epithelial cells showing pearl-like clusters and an occasional appearance of cysts.

4. In isolated instances, the transplanted tooth germs underwent revision after a prolonged period of time; the calcified structures gradually were replaced by an osteoid tissue that resembled bone and which, therefore, was termed by the authors "amorphous osteodentin."

5. The inorganic portion of the newly formed enamel showed a uniformly granular texture; minute crystal-like particles were observable in sections of undemineralized enamel.

6. The enamel of the normally developing tooth germs varied greatly in hardness and solubility, although no correlation between hardness and solubility could be detected.

7. The dentin appeared less resistant to decalcification than the enamel, probably because of its greater permeability, its larger number of organic channels and the smaller size of its apatite crystallites.

8. In all instances of experimentally transplanted tooth germs, the growth and differentiation of the tooth structures appeared significantly retarded.

A list of 265 references to the international literature accompanies the report, and 36 electronmicroscopic pictures demonstrate the findings.

Pini, C. E.; Giamminola, E.; Cavallero, C., and Casilla, E. Istituto Stomatologico Italiano, Universita di Milano, Milan, Italy. I trapianti di germi dentali. Riv.ital.stomat. 15:644-712 July 1960

Experimental observations on the occurrence of postmortem cracks in tooth enamel

Although enamel seems to be a tissue of feeble vitality, cracks never develop in the enamel of incisors of live rabbits. This suggests that the tooth enamel is highly adaptive to conditions, and that animals instinctively avoid physical stresses which might cause traumatic fractures of tooth enamel. Traumatic fractures of tooth enamel also are rare in human beings.

In this study, the material consisted of the upper and lower permanent incisors of 671 rabbits about 12 months old. Immediately after decapitation of the rabbits, the incisors were prepared and were examined at every postmortem hour. Groups of teeth were kept under various conditions—at a moderate temperature, in fresh water, in sea water, in a dry atmosphere, in soil, at 0°C. and at 60°C.

Six hours after death, cracks had developed in the enamel of rabbit incisors, as follows: in 20 per cent of the incisors kept under dry atmosphere; in 13 per cent kept in sea water; in 13 per cent kept at 0°C. and in 20 per cent kept at 60°C. Seven hours after death, the cracks began to appear in the enamel of 6 per cent of the teeth kept at moderate temperature. Eight hours after death, the cracks appeared in 8.0 per cent of the teeth kept in fresh water and in 20.0 per cent of the teeth kept in soil.

By 19 hours after death, cracks had occurred in all the teeth kept in soil, in fresh water, at 0°C. and at 60°C.; by 24 hours, in the enamel of all teeth kept in a dry atmosphere; by 29 hours, in all teeth kept at moderate temperature, and by 30 hours, in all teeth kept in fresh water.

Postmortem cracks in enamel were not substantially influenced by such factors as atmosphere, temperature, sea water, soil, dryness and fresh water.

The occurrence of postmortem cracks in enamel is of substantial interest for forensic dentistry and endodontics.

Awazawa, Yasuyuki, and Yamada, Hiroyasu. Nihon University School of Dentistry, Tokyo, Japan. Experimental observations on the occurrence of postmortem cracks in tooth enamel. J.Nihon U.School Den. 3:23-37 Sept. 1960

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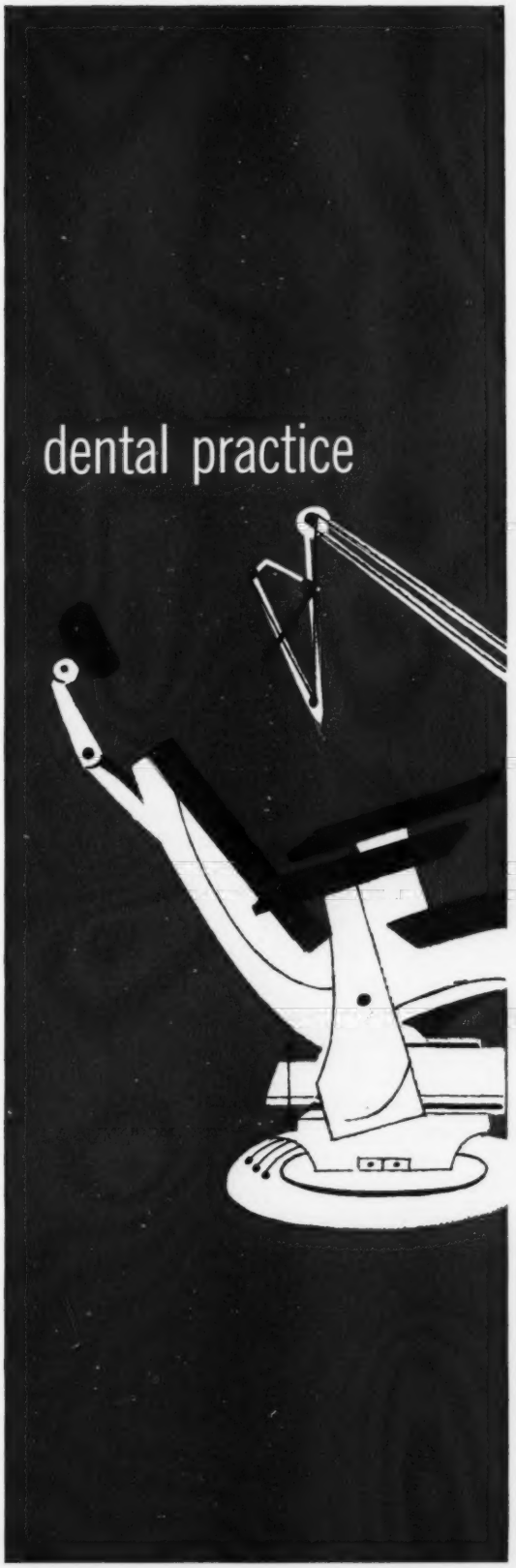


Endodontics

A dozen don'ts in endodontic procedures

To obtain successful results in endodontic procedures, the practitioner must observe these four basic principles: (1) correct diagnosis and a proper selection of patients; (2) maintenance of asepsis throughout every stage of the operation; (3) sufficient debridement of canals to obtain direct access to pulp chambers and canal orifices, and (4) complete filling of the pulp canal.

The following suggestions may aid the general practitioner in the management of endodontically involved teeth:

1. Treatment should not be attempted without exclusion of saliva. The rubber dam should be used.

2. The rubber dam should not be applied on a tooth where one or two walls are broken down below the gingival margin, without first adapting a copper or gold band, contoured to obtain a tight cervical fit.

3. Too much tooth structure should not be cut away in attempting to locate the pulp chamber and canal orifices. However, the opening always should extend to the full periphery of the pulp chamber.

4. No attempt should be made to enter a pulp canal through a proximal, cervical, buccal or lingual cavity without first extending it to a point that will give access in a direct line with the long axis of the tooth.

5. Pulp horns should be included in opening teeth.

6. A fissure bur should not be used on the floor of a pulp chamber. The natural convexity is maintained by using a round bur of suitable size.

7. Debridement should not be commenced prior to measuring and recording the length of a canal. All subsequent instrumentation should be guided accordingly.

8. No attempt should be made to negotiate a canal completely at the first visit, if a suppurating or gangrenous pulp is present.

9. If a barbed broach will not enter the canal freely when an attempt is made to remove a pulp, it is preferable first to negotiate a canal with a file or reamer.

10. A chelating agent should not be used too freely. If the dentin wall is softened in a curbed, constricted apical portion of a canal, usually it is difficult to relocate the canal.

11. A tooth should be sealed correctly after each treatment; otherwise, seepage will occur, with subsequent contamination.

12. Any occlusal stress should be relieved before commencing treatment.

Lieban, E. Alan, 30 West Fifty-ninth Street, New York, N.Y. A dozen don'ts in endodontic procedures. New York J.Den. 31:42-43 Feb. 1961

Extractions

Control of bleeding after dental extraction during anticoagulant therapy

Intravenous or oral administration of estrogens facilitated the prevention and management of bleeding after dental extraction in nine patients receiving long-term anticoagulant therapy. In the majority of instances, no vitamin K preparation was utilized.

The estrogens were used in the form of individual "Secules," each containing 20 mg. of estrogens in their naturally occurring, water-soluble, conjugated form (expressed as sodium estrone sulfate). Immediately prior to its infusion, the solution was slowly reconstituted by means of a sterile diluent containing 0.5 per cent phenol, in the accompanying 5 ml. vial. The solution then was slowly administered intravenously.

Generally the anticoagulant (bishydroxycoumarin, phenprocoumon or warfarin sodium) was omitted for three to five days preceding surgery. Conjugated estrogenic substances were injected intravenously one-half hour prior to extraction. The extractions were performed by several oral surgeons using standard technics. In every patient, the immediate postoperative bleeding was minimal. An additional dose of conjugated estrogenic substances was given in from 8 to 12 hours to those patients who had been hospitalized for extensive extractions or who

evidenced significant postoperative local oozing. The oral administration of the anticoagulant was resumed the day after dental extraction.

In a few patients who previously had been receiving estrogen therapy orally, this therapy also was continued or increased for varying periods of time preceding and following dental extraction.

Three case reports illustrate the treatment.

Roberts, H. J. 1525 North Flagler Drive, West Palm Beach, Fla. Control of bleeding after dental extraction during anticoagulant therapy. J.A.M.A. 175:962-966 March 18, 1961

Dental surgery during continuous anticoagulant therapy

Dental surgery can be performed safely while patients are maintained on anticoagulant drugs. Twenty patients receiving prolonged anticoagulant therapy have undergone 45 surgical procedures in the Department of Oral Surgey of The New York Hospital. The procedures included 36 tooth extractions, two alveolotomies, two operations for the removal of masses of chronically inflamed soft tissue, one apicoectomy, one drainage of an abscess, and the insertion of two Behrman magnetic implants. No incidence of unusual hemorrhage occurred during or after surgery. One patient exhibited some minor postextraction oozing after removal of an upper left second molar with periodontal involvement.

Normal prothrombin time, as determined by the Quick test, varied between 10 and 16 seconds. For surgery, the anticoagulant therapy should be held in the low optimal range, with a prothrombin time of between 22 to 25 seconds. Each patient must be managed with attention to such factors as the presence of other pathologic conditions, concurrent administration of other drugs, the prothrombin time on preceding days, and response of the patient to the anticoagulant drug being used. The dosage must be determined by the prescribing physician who should be experienced in this exacting form of therapy.

The 20 patients varied in age from 43 to 78 years; 16 were men and 4 were women. Each had been on prolonged anticoagulant therapy.

The average prothrombin time for all patients on the day of operation was 25.7 seconds. For 16 procedures, the anticoagulant medication was maintained continuously, including the day of operation.

The patients usually received premedication with 100 mg. of pentobarbital sodium, often supplemented with meperidine hydrochloride, usually 100 mg. Local anesthesia, used in all instances, consisted of 2 per cent lidocaine hydrochloride without a vasoconstrictor.

In addition to the customary measures observed in routine dental surgery, the following points were emphasized:

For extractions, a sharp no. 12 blade was used to incise the interdental papillae on either side of the tooth or teeth to be removed. The incision was carried along the gingival crevice down to the bony crest. The blade hugged the tooth and incised the periodontal fibers. Meticulous care was taken not to lacerate or tear the soft tissues during application of the forceps or luxation of the tooth. A 2 by 2 inch sponge always was in the operator's left hand; whenever he was not working directly at the operative site, the sponge was placed over the area and pressure applied, either by the operator's finger or by the patient's biting. Foamed gelatin sponges were placed in every root socket. A piece of sponge about 1.5 by 1.0 by 0.5 cm. was crushed into a cone shape and placed in each socket. A minimum of two sutures, one across each interdental papilla, was used for every extraction wound. Sutures always were tied under tension, and the tension was maintained for 24 to 28 hours by the slight swelling of the involved tissues. For sutures, no. 00 plain gut was used. Postoperatively, the patient bit on gauze pressure packs for at least half an hour immediately after the surgery. Ice packs were applied externally for 48 hours (one-half hour on, one-half hour off). Mouth rinses and hot liquids were withheld for 48 hours. A soft diet was maintained for 48 to 72 hours.

Since completion of this study, more than 20 additional patients on anticoagulant therapy have had dental surgery, without problems related to hemorrhage.

Behrman, S. J., and Wright, I. S. Medical College, Cornell University, New York, N. Y. Dental surgery during continuous anticoagulant therapy. J.A.D.A. 62:172-180 Feb. 1961

Operative dentistry

An inexpensive wax warmer

A device to warm inlay wax slowly has been made from a baby's bottle heater.

Water is placed in the heater and into it is lowered a "Verone" mixing bowl weighted down with a small amount of Mellott's metal which is poured in just as it is about to freeze. Over the metal is placed a folded napkin, and the wax rests on this. Half of a Petri dish is used as a lid to reduce loss of heat and moisture and to keep out dust.

The heater is thermostatically controlled and has a light built in the base. When the light goes out the water has reached the set temperature. When the water is at 54°C., the wax reaches a satisfactory consistency for direct patterns either with or without a matrix. Since a limited amount of manipulation is first required, it may be necessary to flame the wax lightly before placing it in the cavity.

The temperature of the bath may be adjusted so that the warmer can be used to soften compound tracing sticks.

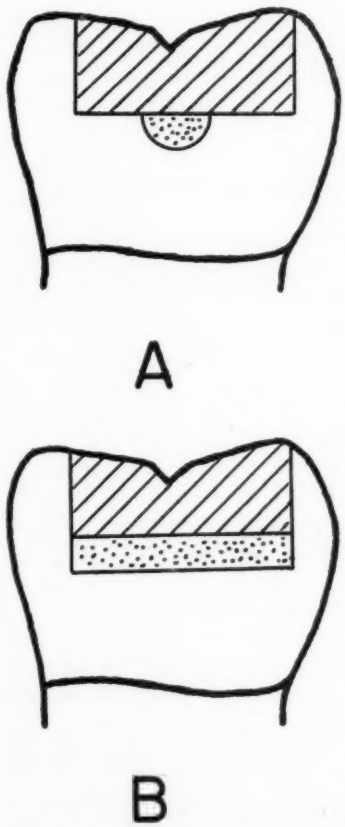
Mumford, J. M. University of Liverpool, Liverpool, England. An inexpensive wax warmer. D.Practitioner 11:53 Oct. 1960

Mechanical failure of amalgam restorations with and without cement bases

Laboratory models of Ivorine teeth containing both deep and shallow cavity preparations received restorations (1) with amalgam alone, (2) with underbases of zinc oxide-eugenol, and (3) with underbases of zinc phosphate cement. Below the underbase in the shallow cavity was a small hemispherical excavation. In the deep cavity the base formed a continuous layer under the amalgam restoration (see illustration). Test loads were applied to the amalgam restorations by means of a ⅛-inch steel ball that could be seated accurately in two intersecting channels (central fossa) on the occlusal surface. The testing was done to determine the point of failure of the fillings with underbase materials.

No significant differences were noted between the amalgam filling alone and the amalgam filling placed above zinc phosphate cement in shallow cavities.

Amalgam restorations with underbases of zinc oxide-eugenol failed under relatively small loads in deep cavities.



Cross sectional views of shallow cavity (A) and deep cavity (B). Diagonal shading represents amalgam, and stippling represents underbase material. For type A restorations with amalgam alone, the hemispherical excavation was absent

With increased depth of the cavity preparation, a general decline in strength of the models was observed, even with amalgam alone. This decline

was extreme with zinc oxide-eugenol as a base material.

Hoppenstand, David C., and McConnell, Duncan. College of Dentistry, Ohio State University, Columbus, Ohio. Mechanical failure of amalgam restorations with zinc phosphate and zinc oxide-eugenol cement bases. J.D.Res. 39:899-905 Sept.-Oct. 1960

A polystyrene-fortified zinc oxide-eugenol cement

The writer has added various substances to zinc oxide cements to produce a toughened cement, but the only material which gave the desired result was polystyrene. A cement containing this substance has been used clinically with success for the past two years. A concentration of 10 per cent polystyrene gives an optimum setting time and ease of manipulation. Because polystyrene has a low solubility in eugenol at room temperature, heat is applied gently until complete solution has occurred. A polystyrene-fortified zinc oxide-eugenol cement feels like phosphate cement and carves smoothly during the early phase of setting.

There is no doubt that this fortified zinc oxide cement, when mixed to a thick consistency, correctly inserted into the cavity and allowed to set for five minutes, will withstand the stress produced during condensation of amalgam. The fortified cement is not recommended as a substitute for zinc phosphate cement in all cavities. It is recommended that the fortified cement be used as a one-step base in deep cavities for gold, silicate and amalgam restorations, especially when an immediate filling is desirable.

The properties of increased toughness and crushing strength possessed by the polystyrene-fortified cement make it an ideal material for the setting of temporary crowns of aluminum, acrylic resin or cellulose acetate. The tooth surface should be lubricated lightly with paraffin before the crown form is applied, to facilitate complete eradication of the cement when the temporary crown is removed.

In every cavity that requires a temporary hermetic seal, the fortified cement is more durable than normal quick-setting zinc oxide cement. Incorporation of a few fibers of cotton-wool into the fortified cement mix further increases resistance to masticatory stress and facilitates subsequent removal of the filling.

It is essential that five minutes elapse from the time of mixing the cement to the commencement of packing amalgam. When a silicate filling is placed over the fortified cement, four minutes should elapse in order that there be no free eugenol which could discolor the filling. Unless the material is being used as a temporary filling, the cavity should be completely free of moisture.

A quick-setting zinc oxide cement, fortified with polystyrene, was compared with a normal quick-setting zinc oxide cement. The fortified cement was found to have a decreased setting time, slightly decreased solubility, slightly increased hardness, no apparent change in crystal structure, and satisfactory sealing properties. Compressive strength of the fortified cement was greatly increased in the early stages of setting, and after seven days was 25 per cent higher than that of normal zinc oxide cement.

Messing, J. J. Dental School, University College Hospital, London W.1, England. A polystyrene-fortified zinc oxide-eugenol cement. Brit.D.J. 110:95-100 Feb. 7, 1961

Oral surgery

Stretching prosthesis for cicatricial deformities of the lips

Two types of prosthetic devices have been found useful to complement plastic surgery of the lips to correct congenital or acquired deformities. The prosthesis acts as a stretching agent against the narrowed rima oris.

For a patient whose upper lip had hardened and acquired a reduced mobility as a result of a keloplastic operation, an acrylic prosthesis was designed to apply slow and continuous stress to stretch the scar. The dental splint, made over a relieved cast, is thickened in the labial part. At 15-day intervals, self-curing acrylic resin is applied to make the labial aspect of the prosthesis progressively thicker. The progressive increase in the thickness of the labial flange of the splint stretches the upper lip.

In patients with closure of the rima oris (caused chiefly from burns by caustic soda), a prosthetic restoration described by Pont and by E. Friteau (1925) is used. Construction has been modified by using self-curing acrylic resin and stainless steel wires. Wearing of the restoration increases the degree of mouth opening.

Pinto da Fonseca, Edmund. School of Pharmacy and Dentistry, University of São Paulo, São Paulo, Brazil. Stretching prosthesis for cicatricial deformities of the lips. J.Pros.Den. 10:1112-1115 Nov.-Dec. 1960

Clinical experience with erythromycin as a prophylactic antibiotic

Erythromycin, a relatively new antibiotic, is produced by strains of *Streptomyces erythreus*. It is available in specially coated tablets (100 mg. or 200 mg.) or in sterile vials (300 mg.) under the brand name Erycin (Schering). It is a basic compound with an empiric formula approximately $C_{37}H_{73}NO_{13}$ without benzene ring structure.

Erythromycin (Erycin) was used after surgical interventions in 709 patients at the Oral Surgery Clinic of the University of Göttingen, Germany. In 355 of these patients, the antibiotic was administered in daily doses of 200 mg. injected intramuscularly to prevent postoperative infection. In the other 354 patients, the antibiotic was orally administered in doses up to 1,000 mg. daily until the sixth postoperative day.

No infection of the surgical wound occurred, although the antibiotic was used (in most instances) only after a hospital infection (in an epidemic form) had broken out in some wards of the clinic, involving mainly patients who had been previously treated with combinations of the penicillin-streptomycin group or the tetracycline group.

In the great majority of patients, erythromycin was well tolerated. In 42 patients (5.9 per cent), side effects occurred, about half of which consisted in vomiting. However, the intolerance reactions seemed to be influenced by postoperative disorders with a temporary tendency to exudation in the brain and atony in the gastrointestinal tract.

For severe postoperative infections which occurred in patients treated with other antibiotic agents, erythromycin in daily doses of 1,250 mg., intravenously injected, or in daily doses of 3,000 mg., orally administered, proved sufficient to control quickly the (mostly staphylococcal) infections.

At the present time, however, there is insufficient evidence that erythromycin has a higher sensitizing potential than the other antibiotic agents routinely used in oral surgery. Additional experience must be accumulated before the final place of erythromycin in the therapeutic armament of dentistry can be established.

In instances in which the use of a sensitizing antibiotic such as penicillin is not considered, erythromycin shows great promise provided that an increase in side effects does not interfere with the desired therapeutic result. Before general use of this antibiotic in dental practice (especially oral surgery) can be recommended, the possibility of a subsequent development of resistant strains of staphylococci and streptococci must be considered.

Marggraf, Wilhelm, and Gregl, Anton. Geiststrasse 11, Göttingen, Germany. Clinical experience with erythromycin used as a prophylactic antibiotic after oral surgical interventions. München.med.Wschr. 102:1746-1749 Sept. 9, 1960

Postparotidectomy syndrome

The auriculotemporal or Frey syndrome consists of ipsilateral redness and sweating of the face, often over the temporal and preauricular regions, evoked by eating. The syndrome occurs regularly after parotidectomy, but only 10 to 15 per cent of those affected will feel distress.

The primary cause is a lesion in a region containing salivary and sweat gland fibers. The most plausible theories advanced to explain the mechanism of gustatory sweating are those based on the principle that sweat glands are reactivated after a period of paralysis due to denervation. The first signs of the syndrome appear about eight weeks after trauma (denervation) to the regular pathways; the syndrome is permanent. The basic mechanism is due to a misdirected regeneration of salivary nerve fibers.

Eleven patients have been treated at the Mayo Clinic between 1951 and 1957 for the auriculo-

temporal syndrome after operation on the parotid gland. The cardinal signs of hyperemia and sweating were seen in all 11 patients, and were precipitated by eating. Any type of food would precipitate the symptoms, but spicy foods particularly stimulated flushing and sweating. Erythema generally appeared after chewing for one minute or less, and sweating followed shortly thereafter; the reaction continued unchanged for the duration of the chewing and faded away within a few minutes after chewing was stopped. The period between operation on the parotid gland and appearance of the syndrome ranged from 2 to 18 months. Once the typical gustatory response is noted, no improvement can be expected.

Since the syndrome is benign, an accurate diagnosis can be a source of satisfaction to the patient. Reassurance and explanation usually suffice with regard to therapy. Roentgenotherapy to the skin involved can produce permanent results only if enough irradiation is given to atrophy the sweat glands. There seems to be no reason for such drastic action. If the area of sweating is small enough, it can be excised. Intracranial division of the glossopharyngeal nerve seems to be impractical and so is oral treatment with anticholinergic agents. Laage-Hellman (1958) suggested topical treatment with an anticholinergic agent in a cream.

Turner, John C., Jr.; Devine, Kenneth D., and Judd, Edward S. Mayo Clinic, Rochester, Minn. The auriculotemporal (Frey) syndrome occurring after parotid surgery. Surg.Gynec.& Obst. 111:564-568 Nov. 1960

Sterilization of surgical gloves

Surgical gloves usually are sterilized either in steam under pressure for 30 minutes at a temperature of 120°C. or for 4 minutes at 134°C. (rapid sterilization).

In autoclaves, sterilization of surgical gloves with steam under pressure efficiently decreases the danger of entrapped air collected in pockets, because the comparatively slow process of heat absorption (30 minutes at 121°C.) is utilized which renders the microorganisms incapable of reproduction and finally destroys them.

The so-called "rapid sterilization" technic may be used for the disinfection of dental and surgical instruments; the available evidence indicates that it cannot be relied upon to produce sterility in surgical gloves.

Eyer, H. Max von Pettenkover Institute of Hygiene and Microbiology, University of Munich, Pettenkoverstrasse 11, Munich 15, Germany. Sterilisation von Operationshandschuhen. Med. Klin. 55:2226 Dec. 2, 1960

Postoperative treatment of pathologic jaw cavities

Pathologic cavities often remain after surgical interventions performed on the jaws. Some cavities may be present prior to operation. Others may result from surgical removal of bone fragments, infected roots or apexes, retained or ectopic teeth, and oral cysts or tumors.

These pathologic jaw cavities, however, do not always heal satisfactorily after complete suturing. Repeated examinations are required to prevent postoperative infection, although the incidence of infection can be greatly reduced by the use of antibiotics or sulfonamides. Infection and suppuration sometimes occur, requiring the reopening of the surgical wound.

The most recent methods of postoperative treatment of pathologic jaw cavities include the use of autogenous or heterogenous bone grafts. These methods have been used experimentally by Huebsch and Wickstrom (1951), Ginestet and Ouay (1952), Capozzi (1955), and Freidel and Duclos, (1956); and clinically by Stuteville (1951), and Kellemberger (1954).

According to these authors, the treatment consisted in postoperative filling of the pathologic jaw cavities with fragments of bone tissue. The grafts were immersed in paraffin, and later in a solution containing potassium chlorate and penicillin. According to these authors, success without complications has been obtained only in 8 per cent of patients.

A significantly greater success was achieved by the clinical treatment of pathologic jaw cavities (especially those resulting from cysts), performed at the Dental Clinic of the University of Turin, Italy. After complete elimination of the cystic portions, the pathologic jaw cavities were filled with

a radiopaque paste containing 20 Gm. iodoform, 0.5 Gm. thymol, 20 drops of bergamot essence, and an amount of radiopaque substance (Radiopol) sufficient to produce a thick mixture. After the cavity was filled, the surgical wound was sutured. In the great majority of instances (almost 90 per cent), healing without complication occurred. Gradual absorption of the radiopaque paste and complete closure of the cavities by newly formed osseous tissue was observed.

Similar favorable results were obtained by surgical treatment of cystic granulomas developing after apicectomy. The treatment method succeeded in all but 5 per cent of instances. Recently, the radiopaque paste was replaced by an absorbable hemostatic (fibrin or gelatin) sponge, saturated in a sulfonamide solution.

Over 3,000 patients with pathologic jaw cavities have undergone treatment with excellent results.

Roccia, B. Dental School, University of Turin, Italy. Postoperative treatment of pathologic jaw cavities. Panminerva med. 2:568-570 Dec. 1960 [in English]

A long-range evaluation of cleft palate repair

In the past four decades, important strides have been made in solving cleft palate problems. The public now realizes that babies with cleft lip or cleft palate can be treated effectively and may lead happy and useful lives. Infectious diseases which formerly plagued such patients now can be prevented, and the use of anti-infective agents has minimized postoperative complications. With progress in orthodontics, prosthodontics, speech pathology and psychology has come the view that surgical treatment alone is not sufficient to obtain complete rehabilitation of the cleft palate patient. Finally, the plastic surgeon is better prepared for his task.

The author has reviewed 200 cases of cleft palates he has treated, and has reached the following conclusions:

The most important factors influencing the results of cleft palate repair are the anatomic features of the cleft, the developmental pattern of the patient, and the fidelity with which the primary repair is accomplished. Of the 200 patients, 35 per cent had unilateral clefts of lip and palate; normal speech was obtained in 79 per cent of the patients in this group who were treated from 1946 to 1954. Five per cent of the patients had midline cleft palate associated with unilateral cleft lip; in 62 per cent of these patients, normal speech was achieved. Ten per cent of the patients had a midline cleft palate with a bilateral cleft lip; 77 per cent attained normal speech. Sixteen per cent of the patients had midline cleft palate without cleft lip; 55 per cent attained normal speech.

Other significant factors influencing the results are prevention of postoperative infection, proper lip reconstruction with preservation of the forward position of the premaxilla, and adjunctive therapy by orthodontists, prosthodontists and speech pathologists.

In this series, the poorest results in the comparatively uncomplicated instances were obtained in the repair of midline cleft palate not associated with a cleft lip.

Complex types of cleft, those associated with other major anomalies, and the secondary repairs after previous loss of palatal tissue seldom resulted in completely normal postoperative speech.

Subsequent lengthening operations were performed in 15 per cent of patients with uncomplicated cleft palate.

Glover, Donald M. 10525 Carnegie Avenue, Cleveland 6, Ohio. A long-range evaluation of cleft palate repair. Plast.& Reconstr. Surg. 27:19-30 Jan. 1961

Protection of the surgical wound with a new plastic film

A newly developed polyvinyl film (VI-DRAPE Surgical Film) has been used successfully as an aseptic means in more than 1,300 surgical interventions performed at the Veterans Administration Hospital and the University Hospital, Jackson, Miss., during the past two years.

The use of this aseptic film, which is attached to the skin of the operative area by a spray-on plastic adhesive (VI-HESIVE Adherent) offers several advantages for all forms of operative procedures.

Almost the entire operative field remains in full view permitting the surgeon to observe and palpate all topographic landmarks. The area

around the incision can be kept free of drapes and towels, allowing a better visualization of the surgical wound.

The use of this plastic film proved to be particularly advantageous in instances in which a great amount of fluid had accumulated around the operative site, because there were no skin towels to become moist and possibly contaminated. The plastic film was especially useful when irrigating solutions had to be used.

Utilization of this plastic film adds another step toward the improvement of aseptic technic in any form of surgery.

Artz, Curtis P.; Conn, J. Harold, and Howard, Hector S. 2500 North State Street, Jackson, Miss. Protection of the surgical wound with a new plastic film. J.A.M.A. 174:1865-1868 Dec. 3, 1960

Orthodontics

A review of the retention program

Factors that allegedly should determine the type and length of retention of corrected malocclusions of the teeth include: number of teeth moved, the distance that these teeth have been moved, the occlusion, the age of the patient, the cause of malposition, the rapidity of correction, the degree of rotations corrected, the length of the cusps, and the health of the tissues.

A review of the literature indicates that retention requirements may be divided into the following four categories:

Group I: Dentitions that require no retention in either arch: (a) anterior crossbites, provided a reasonable overbite has been established; (b) posterior crossbites, after good interdigitation has been established and whenever the teeth have not been tipped abnormally in order to correct the crossbite; (c) some "high cuspid" extraction instances and some dentitions treated only by planned extraction therapy; (d) dentitions in which maxillary or mandibular molars have been tipped distally or bicuspids tipped mesially to provide space for the eruption of second bicuspids (once the second bicuspid has erupted, no further retention is necessary); (e) Class II malocclusions treated with headgear on the basis of restraint of growth (once the growth period has passed, no further problem of retention will be evident).

Group II: Dentitions in which it is necessary to continue permanent or semipermanent retention in one or both arches: (a) instances where expansion has been carried out in one or both arches; (b) Class II or Class III relations which have been corrected by creating a "dual bite" (muscular adaptation will allow the mandible to be positioned forward after strong Class II elastic therapy, and the patient seemingly cannot retract the mandible any farther; yet if Class II therapy is discontinued, in a matter of several weeks the patient again will be able to retract his mandible farther posteriorly); (c) severe rotations, particularly of the maxillary and mandibular anterior teeth and mandibular bicuspids (whether overrotation might lessen this problem of retention is not known); (d) dentitions which initially had considerable spacing.

Group III: Dentitions requiring varying lengths of retention: (a) Class II dentitions, extraction or nonextraction, need no retention if therapy is well-instituted provided that the untreated mandibular arch did not show any severe rotations and that there were no breaks in contact alignment other than in the vertical plane. Some of these dentitions whose maxillary anterior teeth have been retracted need some restraint for an undetermined period. Sometimes, if good muscle balance has been achieved, no retention is necessary. Hence, short periods of full-time retention, then two or three months of retainers at night only and later every other night, may be sufficient; (b) dentitions in which deep overbites are present may require an indeterminate period in retention to attain the greatest possible vertical development in the buccal segments while the anterior teeth are held in a minimum amount of overbite. Certainly, growth is an important factor in determining the permanancy of result and the time of retention is directly dependent on growth; (c) Class II, Division 2 corrections require indeterminate periods of retention. In Class II, Division 2 malocclusion, possibly the response in adaptation of musculature has much to do with the stability of the treated result; (d) Class III corrections achieved with the assistance of sur-

gery in shortening the mandible or setting it posteriorly by any of a variety of methods require varying lengths of retention; (e) dentitions involving the ectopic eruption of teeth or cases in which supernumerary teeth have been present require varying lengths of retention.

Riedel, Richard A. School of Dentistry, University of Washington, Seattle, Wash. A review of the retention program. Angle Orthodont. 30:179-199 Oct. 1960

Nasomaxillary proportional constancy

In 1951 the author published data supporting the contention that reference points representing the incisal edge of the maxillary permanent central incisor and the occlusal surface of the maxillary permanent first molar lie nearly equidistant from nasion. These findings were supported by Prakish and Margolis (1952).

A longitudinal and cross-sectional study of the lateral cephalometric tracings of 42 Seattle school children with normal occlusions was undertaken to elucidate the nature of a previously established maxillary dentoskeletal pattern.

It was statistically determined that reference points representing the incisal edge of the maxillary central incisor and the occlusal surface of the maxillary permanent first molar are situated nearly equidistant from nasion in those subjects with normal occlusions. The statistical results confirm that this pattern prevails within extremely small limits of variance. This stable relationship is a proportional property of the nasomaxillary complex.

This rigid proportionality, encompassing the dentition and yet extending appreciably beyond the teeth, is believed to be instrumental in regulating the occlusion. The small variance of the proportionality suggests its role as a sort of common denominator of upper dentofacial orientation.

The small changes in the proportionality with age are attributed to continued tooth eruption between the ages of 8 and 12 years, and to skeletal maturation between the ages of 12 to 18 years.

These longitudinal changes in the proportionality are correlated positively with changes in the overbite. However, vicissitudes in the overbite are not significantly correlated with variance in the proportionality. This suggests that variance in the overbite is determined largely by factors associated with the mandible.

A study of the craniofacial orientation of the components of the proportionality led to an examination of normal craniofacial positional variance as an obscuring factor in cephalometric analysis. Normal individual differences in craniofacial positioning can obscure basic intrafacial similarities. Nasomaxillary proportional constancy is not influenced by craniofacial positional variance. The constancy of the orientation of pogonion to components of the proportionality also is attributed largely to freedom of these measurements from the obscuring influence of craniofacial positional variance.

The small variance in the proportionality and its relationship to the vertical orientation of the occlusion suggests its usefulness in assessing vertical occlusal problems.

Zingeser, Maurice R. 502 Portland Medical Center, Portland, Ore. Nasomaxillary proportional constancy. Am.J.Orthodont. 46:674-684 Sept. 1960

Response to activator therapy

In 1936 Andresen and Häupl introduced a new orthodontic concept, functional jaw orthopedics; the appliance used was termed the activator, because the appliance was supposed to activate and change the function of the muscles of mastication. Although this treatment method has been used for more than 20 years, there is still much controversy regarding the rationale of the increased muscle activity produced by the activator.

This study was made to investigate electromyographically the neuromuscular response to activator therapy and its clinical significance. Bilateral electromyograms were made of the temporalis, masseter, orbicularis oris and suprahyoid muscles of 11 subjects ranging in age from 8 to 30 years. The muscular activity was studied both during the sleep of the patients and while they were awake. The following conclusions were reached:

1. During sleep no increase in muscle activity was found in response to wearing an activator. No reflex biting or increased postural tonus was recorded. The working principle of the activator—

that it is a functional stimulator during the night—is seriously questioned. The admittedly good result of activator treatment seemingly cannot be attributed to an increased occurrence of intermittent, muscular forces.

2. The activator receives its force and action primarily by purposeful positioning of the mandible outside the postural area. This elicits a tension against the teeth because of the tendency of the mandible to return to the original position. The reposturing primarily is caused by the stretching of certain muscles and tendons and their tendency to rebound elastically. It is the immobile activator, pressing against the teeth, which is active.

3. When the activator was worn during the daytime an increased postural activity usually was recorded in the masseter and suprahyoid muscles but not in the temporal muscles. The muscle activity in biting contractions decreased considerably in all tested muscle areas. The swallowing reflex often was preceded by a long, suckinglike contraction and occurred more frequently with an activator in the mouth. The increased swallowing activity probably is due to a greater flow of saliva, caused by the introduction of an insoluble material in the mouth.

4. A long period of activator treatment of patients with Angle's Class II malocclusion seems to result in a permanent change in the basic contraction pattern of the jaw muscles and a repositioning of the mandible in a forward direction.

The clinical significance of these findings are as follows:

1. To obtain the best therapeutic effect of the activator, the "working bite" of the appliance should be taken below and ahead of the original position of the mandible. This elicits a continuous pressure against the teeth because of the elasticity of the muscles.

2. To improve the effectiveness of the therapy, the activator should be worn as much as possible during daytime. An active biting on the activator 100 to 200 times a day also is recommended.

Ahlgren, Johan. Centrallasarettet, Danderyd 1, Sweden. An electromyographic analysis of the response to activator (Andresen-Häupl) therapy. Odont. Revy 11:125-151 June 1960

Planes in lateral roentgenograms

The term "Frankfort horizontal plane" should be used only for the anthropometric determination of the facial skeleton. In the orthodontic diagnosis and the interpretation of lateral roentgenograms or teleroentgenograms, the terms "oribital point" and "tragion point" are far better suited because these points determine the course of the line between eye and eye. Only by means of lateral cephalometric roentgenograms can the final analysis of the facial profile be made.

The term "horizontal (H) plane" should be used in orthodontic diagnosis only to designate the plane at right angles with the long axis of a tooth.

The plane between the mandibular articular process and the orbital point (which plane deviates from the line between the eyes) should be called "temporomandibular-orbital plane." The orbital point established at the lower margin of the bone orbit has proved to be superior to the orbital point established on the facial skin, for all orthodontic, cephalometric and anthropometric purposes.

Stahl, Arnulf. Hospitalstrasse 1, Heidelberg, Germany. Frankfort horizontal plane, 'H' plane and temporomandibular-orbital plane in lateral roentgenograms and teleroentgenograms. Stoma 13:204-211 Aug. 1960

Planned serial extractions in orthodontic treatment

Tooth crowding may be corrected either by spontaneous growth of the jaws or by space maintenance obtained with orthodontic appliances.

In many instances, however, crowding of upper or lower incisors is associated with the presence of a significantly reduced alveolar bone or an inadequate development of other parts of the maxillofacial region. This type of tooth crowding is characterized by a mesial inclination of the erupting permanent teeth and a premature loss of the deciduous teeth.

Children with crowded anterior teeth are extremely susceptible to dental caries. Preventive treatment consists in carefully planned extraction of the crowded deciduous teeth, thereby creating

sufficient space for the permanent teeth. Patients in whom premature extraction of the deciduous anterior teeth has been performed for orthodontic reasons should be followed up carefully. If they show gradual and continuous reduction of space during the eruption of the permanent teeth, space maintainers should be inserted immediately.

No orthodontist would deny the possible adverse effects of a premature serial extraction of deciduous teeth on the development of the dental arches. Such an intervention may cause an anteroposterior reduction of the alveolar bone. In many instances of tooth crowding, however, planned serial extraction is indicated, because it may compensate for the space lost.

Depending on the position of the lower incisor, premature extraction of a lower permanent incisor instead of a deciduous cuspid is sometimes indicated. This procedure, however, should be performed only after the eruption of all permanent teeth (with the exception of the third molars). Similarly, the extraction of the upper second bicuspid instead of the first bicuspid will obtain the desired result.

Neumann, Bedřich. Sokolská 7, Kunz-Ostrava 1, Czechoslovakia. Orthodontic treatment of tooth crowding by planned serial extractions. Českoslov. stomat. 60:371-381 Sept. 1960

Periodontics

A new adhesive foil dressing for periodontal surgery

When available adhesive foil materials are used in periodontal surgery, the foil often peels from the pack, leaving a dressing which is prone to marginal fracture.

A new adhesive surgical dressing with improved qualities can be fabricated as follows.

Rezifilm, a methacrylate resin, is sprayed on the surface of a large sheet of tin foil of suitable thickness, and allowed to dry. A second coat is applied; before it dries, Orahesive powder (an adhesive powder composed of gelatin, pectin and carboxymethylcellulose) is dusted liberally on the surface. When the resin and adhesive are dried, the excess powder is removed by inverting and gently shaking the sheet of tin foil.

Strips of foil then are cut to sizes adequate to cover the operative site. The foil is protected from moisture until it is applied to the surface of the wound or placed over a suitable periodontal pack. The foil is gently burnished (without wetting) into all undercuts.

Preliminary observations in 40 patients indicate that such treated foil is highly adhesive, retentive and protective. Operative sites have been covered successfully for periods up to 14 days.

Berman, Charles L.; Beube, Frank E.; Odrich, Ronald, and Kutscher, Austin H. School of Dental and Oral Surgery, Columbia University, New York, N.Y. A new adhesive foil dressing for periodontal surgery. J.Periodont. 32:14 Jan. 1961

Roentgenography

Ultra-hard roentgen rays in the treatment of malignant oral tumors

During the last decade, the surgical treatment of malignant oral tumors has made immense progress. However, there are still many instances in which inoperable tumors may be influenced by roentgenotherapy.

Significant progress in roentgenotherapy was achieved by the use of the recently developed ultra-hard roentgen rays; that is, the utilization of rays with a quantitative energy of more than 3 meV, a short wavelength and a great penetrative power. To this type of ray belongs the hard gamma ray emitted by radium or cobalt^{60}, as well as that produced by an electron having an energy of more than 3 meV. Protons and deuterons, used to produce bombing particles for nuclear disintegration, also emit ultra-hard rays which, however, have—as yet—only a scientific (research) application.

All ultra-hard roentgen rays possess a specific "anabolistic-electrical" capacity. Under this term, an increase in dosage from the surface to the depth is expressed, which occurs when the secondary electron rays obtain a greater range and move in the same direction as the primary electron rays. By the fact that the dosage increases

with depth, the skin, mucous membrane and healthy tissue can be spared, a benefit which is especially important for the deep roentgenotherapy of malignant oral tumors.

Another advantage of the ultra-hard roentgen rays is their absorbency; that is, the degree to which they are absorbed by the irradiated tissues, permitting the sparing of bones and marrow which are hypersensitive to any form of radiation.

Ultra-hard roentgen rays can be produced by a betatron or by van de Graaf's high-voltage electrostatic generator. Both types of apparatus are comparatively small and, therefore, easier to manipulate than is the high-voltage roentgenotherapeutic apparatus.

However, the increased penetrative power of these rays necessitates greater protective procedures against radiation damage.

The relative biologic effects of these rays are essentially different from those of the conventional roentgen rays, but their tolerability is greater.

The use of ultra-hard roentgen rays has proved successful in the majority of patients with inoperable malignant tumors, (especially those arising in the oral cavity), treated at the Medical Clinic of the University of Erlangen, Germany.

Barth, Gunther. Medical Clinic, University of Erlangen, Krankenhausgasse 12, Erlangen, Germany. Die Anwendung ultraharter Strahlen zur Behandlung bösartiger Geschwülste. Deut.med.Wschr. 85:1121-1136 June 24, 1960

High or low kilovoltage

Now that adjustable kilovoltage controls have been incorporated in dental x-ray units, questions are being raised as to the roentgenographic effect and respective merits of high or low kilovoltage. Kilovoltage, milliamperage and time are the companion factors which primarily control density and contrast in the roentgenogram, and an understanding of their individual characteristics and relationships is essential for control of the quality of the roentgenogram.

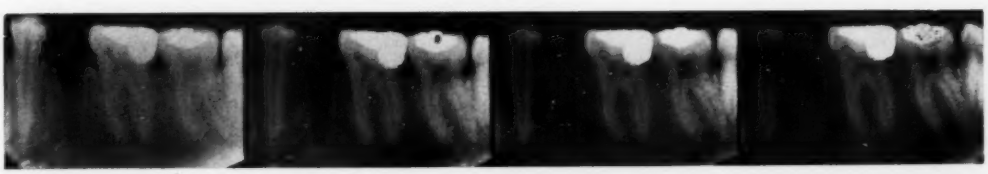
MaS multiplying factors for use when kilovoltage is changed (direct exposure only)

Old KvP	MaS multiplying factor										
40	1.	.42	.26	.18	.13	.1	.08	.06	.05	.04	.032
45	2.3	1.	.62	.45	.32	.24	.19	.15	.12	.1	.08
50	3.7	1.6	1.	.7	.5	.4	.3	.24	.19	.15	.12
55	5.4	2.3	1.5	1.	.74	.56	.43	.35	.27	.22	.18
60	7.5	3.2	2.	1.4	1.	.78	.6	.48	.37	.3	.24
65	9.8	4.1	2.6	1.8	1.3	1.	.8	.62	.48	.4	.32
70	12.5	5.3	3.3	2.3	1.7	1.3	1.	.8	.62	.52	.42
75	16.	6.6	4.2	2.9	2.1	1.6	1.3	1.	.8	.6	.54
80	20.	8.5	5.4	3.7	2.7	2.1	1.6	1.3	1.	.81	.66
85	26.	11.	7.	4.8	3.5	2.7	2.	1.6	1.3	1.	.82
90	30.	13.	8.	5.6	4.2	3.2	2.5	1.9	1.6	1.25	1.
New KvP	40	45	50	55	60	65	70	75	80	85	90

Source: Fuchs, Arthur W., *Principles of Radiographic Exposure and Processing*, published by Charles C Thomas, 1958.

Milliamperage is the measure of the electron current passing through the tube. It is controlled by increasing or decreasing the temperature of the tube filament. This governs the number of electrons made available to form the electron stream; the hotter the filament, the greater the number of electrons and the higher the milliamperage. Newer dental x-ray units are designed to operate effectively up to 15 milliamperes, whereas the recommended operating level for older units is 10 ma. Milliamperes and seconds of exposure are considered as a single factor known as milliampere seconds, indicated by the symbol MaS or ma. sec. It is this factor which primarily controls the density of the image, all other exposure factors remaining constant (Fig. 1). Den-

Figure 1 Roentgenograms showing effect on density as ma. sec. is increased; 60 kvp and 15 ma. were used. Exposure time was doubled for each consecutive roentgenogram



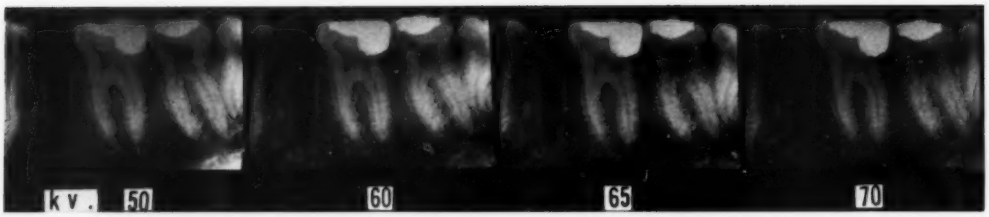


Figure 2 A (above and above right) = roentgenograms made with various kilovoltages ranging from 50 to 90. In B (left), the cement base does not show in first molar; in C (below, left), the cement base can be differentiated from amalgam filling

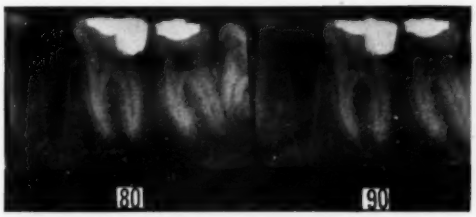
sity, in nontechnical terms, is the degree of blackness on a roentgenogram.

In practice, the milliamperage is seldom changed; the time is the variable in the factor of milliampere seconds. Unsharpness of the image caused by motion will be lessened if the x-ray unit is regularly operated at its highest milliampere capacity, since this will permit reduction of the exposure time and thereby lessen the chance of movement.

Kilovoltage is an indication of the quality, that is, the wavelength, or penetrative power, of the rays from the x-ray tube. Kilovoltage controls the velocity of the electron stream within the tube. The speed with which the electrons strike the target on the anode determines the wavelengths of the roentgen rays in the beam, thus controlling the penetrating power of the beam. This is one of the major factors governing the contrast of the roentgenogram.

As the kilovoltage is raised, the bombardment of the target becomes more intense and produces a beam of shorter average wavelength having

Figure 3 (Below and below right) Series of roentgenograms made by using fixed milliampere seconds and progressively increased kilovoltages



greater penetrating power. As the kilovoltage is lowered, the average wavelength increases, and the penetrating power decreases. It is this penetrating characteristic of the x-ray beam that primarily controls the contrast of the roentgenogram. Roentgenographic contrast is indicated by the difference in densities between adjacent areas.

Two adjacent structures of almost similar absorption will be most strikingly differentiated when the roentgenographic contrast is high, that is, when low kilovoltage is used with adequate exposure. However, with a specimen having a wide range of thicknesses or absorptions, a high-contrast technic will result in unsatisfactory detail visibility in either the low-absorption or high-absorption areas of the specimen, or in both.

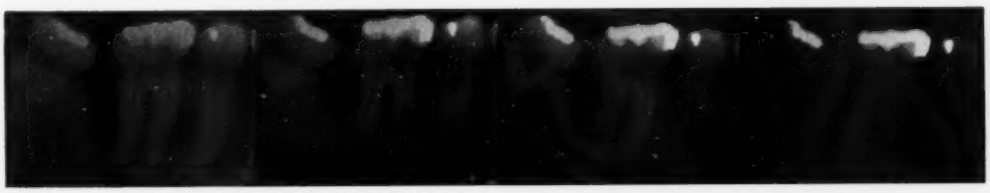
In dental roentgenography, there is an upper limit to the kilovoltage which will produce a roentgenogram possessing good interpretive qualities, and there is a lower limit which is necessary to insure penetration of all the structures within a practical exposure range. Relative characteristics of roentgenograms made from 50 to 90 kv. are demonstrated in Figure 2A. It will be noted that as the kilovoltage is raised, the various densities of the heavier structures (teeth and restorations) become more discernible, because of the greater penetrating power of the beam producing the long-scale contrast. This is especially apparent in the cement and amalgam restoration in the first molar. The roentgenograms produced by 50 to 65 kv. fail to differentiate the cement from the amalgam, but those produced by 70 to 90 kv. show progressively greater differentiation between the two filling materials (Fig. 2B and 2C).

Kilovoltage usually is thought of as controlling roentgenographic contrast; it also affects the density of the image. A series of roentgenograms was made using a fixed milliampere second factor and a varying kilovolt peak (kvp) factor, which was increased in increments of 10, from 40 to 90 (Fig. 3). The increase in density makes it apparent that as the kilovoltage is increased, the milliampere seconds must be decreased if uniform roentgenographic density is to be maintained.

There is no precise method for determining the exact ratio between kilovolts and milliampere seconds in controlling density, since the type and thickness of the patient's tissues, characteristics of the x-ray unit, type of film used, and processing factors exert influence on the end result. However, a method for determining the kilovolt-milliampere-seconds relationship is given in the table. For instance, if a satisfactory film density is produced, using 65 kv. and 30 ma.sec., and an increase to 90 kv. is desired, it is necessary to reduce the exposure to 9.60 ma.sec. or, for practical purposes, to 10 ma.sec. (30 ma.sec. x .32 multiplying factor).

As the kilovoltage is raised, the amount of scattered radiation increases, especially when roentgenograms of regions of considerable volume and density are being taken. Unless this scattered radiation is controlled, it will fog the film and tend to obscure the image detail.

The use of cones and diaphragms to limit the spread of the x-ray beam to the smallest practical diameter is desirable (2¾ inches for intraoral ex-



aminations). Not only does this reduce the amount of scattered radiation by decreasing the volume of tissue irradiated, but at the same time it also lowers the radiation dosage to the patient.

Updegrave, William J. Temple University School of Dentistry, Philadelphia, Pa. High or low kilovoltage. D.Radiog.& Photog. 33:71-78 Dec. 1960

Pedodontics

Partial dentures as space maintainers

Most dentists advise that all spaces created by the early loss of deciduous teeth should be maintained with some type of space maintainer to prevent the adjacent teeth from moving together and distorting the arch. When a partial denture is used as a space maintainer, there is no loss of function. Partial dentures can be used to maintain function and space in either arch in patients from 7 to 18 years old. When the growth period is over and the jaws have attained their mature size, the partial denture as space maintainer should be replaced by fixed bridgework where this is indicated.

The advantages of a partial denture used as a space maintainer are that the denture restores esthetic appearance and function and maintains space where two or more deciduous or permanent teeth are lost. Disadvantages are that the partial denture is a removable appliance, it can be lost or broken, and the child may find it difficult to adjust to the denture.

Before the partial denture is constructed, roentgenograms and study models should be obtained and a treatment plan completed. The partial denture should be completely tissue-supported, with the saddles kept free from the necks of the teeth and the gingival margins. Only point contacts should be established with teeth adjacent to the edentulous spaces. Retention is obtained by accuracy of adaptation to the mucosa and by the action of atmospheric pressure.

Acrylic teeth often are the most satisfactory for such partial dentures because the acrylic teeth can be adapted directly to the alveolar crest shortly after the loss of natural teeth. Also, acrylic teeth are easy to handle when the denture is rebased. The chief criterion for posterior teeth is function rather than appearance.

Most children adjust quickly to partial dentures. However, the parents should continue to check the dentures initially until the child uses the dentures routinely. After insertion of a partial denture, the child should return to the dentist every third month for examination. If the child is in an active period of growth when the denture is constructed, it will have to be rebased soon after the active period of growth has ended. If the child is very young, the denture will have to be remade in the course of the child's development. Space for erupting teeth can be obtained by removing parts of the denture adjacent to the place of eruption.

Bjorndal, Arne M. College of Dentistry, State University of Iowa, Iowa City, Iowa. Partial dentures as space maintainers. Iowa D.J. 46:256-257 Oct. 1960

Anesthesia

A clinical comparison of 2-chloroprocaine and lidocaine

Two per cent solutions of chloroprocaine hydrochloride and lidocaine hydrochloride, each with 1:100,000 epinephrine, were compared in a clinical test in 51 children ranging in age from 9 to 15 years old. Both block and infiltration procedures were used. A Ritter pulp tester was used for electrical stimulation.

In block anesthesia, average onset time for chloroprocaine was 182 seconds, for lidocaine, 254 seconds. Average duration of anesthesia was 78 minutes for chloroprocaine, 107 minutes for lidocaine. The profundity of anesthesia was about equal for both agents, but there were more poor results (additional anesthetic required) with lidocaine than with chloroprocaine.

In infiltration procedures, average onset time was 195 seconds for chloroprocaine and 246 seconds for lidocaine. Average duration of anesthesia was 64 minutes for chloroprocaine, 73 minutes for lidocaine. More poor results were obtained with chloroprocaine than with lidocaine. There were

no undesirable side effects of consequence from either agent.

Ingino, A. L., and Carter, W. J. School of Dentistry, University of Kansas City, Kansas City, Mo. A clinical comparison of 2-chloroprocaine and lidocaine. J. Missouri D.A. 41:12-14 Jan. 1961

Local anesthetics. II

Untoward reactions to local anesthetics may be due to absorption of the anesthetic into the circulation and production of systemic effects, to local tissue destruction or to true allergic phenomena. Reactions often are erroneously ascribed to sensitivity or idiosyncrasy whereas logically they can be explained on recognized pharmacologic grounds even though exceedingly small doses may have been responsible for the effects observed.

Systemic reactions to the local anesthetics are those most frequently encountered with symptoms referable to the central nervous, respiratory or cardiovascular systems. These result from the absorption into the blood stream of quantities of drug that, in the central nervous system, may excite the cortex to the point of convulsion or produce drowsiness and unconsciousness.

It is not generally understood that local anesthetics may depress the myocardium directly by reason of their quinidinelike effect on conduction, contractility and irritability. Procaine and lidocaine have been employed for cardiac arrhythmia. The effect on the myocardium, leading to hypotension or cardiac standstill, is enhanced by the peripheral vasodilatory actions of these drugs. All these untoward effects can occur rapidly in response to the injection of much less than the expected toxic doses and in some instances to exceedingly small quantities. The most feared outcome is sudden, simultaneous respiratory and cardiac cessation.

Since the level of an anesthetic in the circulating blood is the prime factor in the production of systemic reactions, the area of injection is important in a consideration of the rapidity of absorption. The intravenous route is the most dangerous, but absorption from the pharyngeal, tracheal and bronchial mucosa produces high blood concentrations almost as rapidly. The reason for this is the dense vascularity of these regions, the rapid absorption of fluid from the lungs and the direct circulation of drug to the myocardium, where a depressant effect may be produced. Other hazardous injection sites, because of greater vascularity, are the tissues of the head and neck and the perivertebral region. Least dangerous are the subcutaneous tissues of the trunk and limbs.

The least quantity of an anesthetic must be utilized for a contemplated procedure. The total amount of the drug injected is more important than the concentration or volume of fluid. But the operator should employ the minimal effective concentration and the smallest volume, bearing in mind that sensory-nerve impulses are blocked by the least concentrations of all.

As a secondary measure the rate of absorption should be retarded as much as possible. This can be accomplished to some extent by slow injection and repeated aspiration for blood, particularly in densely vascular regions, to avoid intravenous injection. The vasoconstrictive property of epinephrine, added to the anesthetic solution, provides greater assurance against rapid absorption. Additional benefits are the prolongation of anesthesia and decreased bleeding, both the result of vasoconstriction. Peak prolongation of anesthesia and probable maximal protection against absorption is achieved with the employment of 1:100,000 concentrations of epinephrine or 1.0 mg. per hundred milliliters of solution. However, almost identical effects can be obtained with 1:200,000 or 1:300,000 concentrations.

Only the most effective concentrations of epinephrine should be employed for local anesthesia since the drug may prove to be toxic in its own right. Indeed, many reactions to the local anesthetics resemble the classic pharmacologic effects of epinephrine in the form of nervous apprehension, body tremors, skin pallor, sweating, rapid heart rate and palpitation.

The preanesthetic administration of a short-acting barbiturate generally is believed to protect the patient against the central stimulating or convulsive properties of the local anesthetics. However, the small quantities of barbiturate usually employed provide little more than relief from apprehension. Experimental evidence suggests that full narcotic rather than sedative doses of

the barbiturate are required to prevent convulsions. This is not meant to imply that these drugs should not be used in the treatment of this type of reaction.

Vandam, Leroy D. 721 Huntington Avenue, Boston 15, Mass. Local anesthetics. II. New England J. Med. 263:963-965 Nov. 10, 1960

Hypnosis is not entirely innocuous

The use of hypnosis for the induction and maintenance of anesthesia is not particularly complicated or dangerous, provided the anesthesiologist observes a few precautions in taking the personal history, and during induction of the trance. However, complications can arise from this usually innocuous procedure. By proper selection of patients the risks and complications can be minimized.

Hypnosis should not be attempted when patients do not want to be hypnotized.

Some patients say they want to be hypnotized, but resist the procedure during the induction. This resistance may be exhibited by anxiety, or by breaking rapport through laughter, coughing, difficulties in swallowing, opening the eyes, and so forth. These patients usually have some unconscious conflict about accepting the status of dependent passivity required for hypnotic anesthesia. Attempts to force such patients into a hypnotic trance usually are unsuccessful. The mere attempt to force a hypnotic trance can be the precipitating trauma to anxiety neurosis or a flight into hypomaniclike defense.

Hypnosis usually is contraindicated in paranoid patients. The patients are characterized by suspiciousness and feelings that people are talking about them behind their backs. The use of hypnosis is subject to gross misinterpretation by paranoid patients, and never should be attempted. The practitioner, before attempting hypnosis and while taking the patient's history, should include the following questions: "Have you ever felt persecuted?" and "Have you ever thought that the group was out to get you?"

Hypnosis should not be misused. During hypnosis do not ask the hypnotized patient about personal matters; suggestions should refer only to relaxation, pain, suppression, and sleep, and not to any other topics the patient may discuss. Do not misuse the procedure by demonstrating an ability to make the patient do things that make him seem foolish.

The complications that can arise from hypnosis are rather serious. Their occurrence is infrequent, and with proper precautions, they can be made even less frequent, and hypnosis will find its important place as an agent of anesthesiology.

Meldman, M. J. The Forest Hospital, Des Plaines, Ill. Hypnosis is not entirely innocuous. Anesth.& Analg. 40:75-76 Jan.-Feb. 1961

Therapeutics

Diagnosis of oral lesions related to the use of drugs and other substances

Drugs, chemicals, foods and other substances may affect the oral tissues by (1) direct injury, (2) local deposition, (3) alteration of the bacterial flora, (4) allergic reaction, and (5) indirect or uncertain action. Diagnosis often is difficult, and necessitates a thorough history.

Usually, it is easy to determine whether a drug or chemical has injured the oral tissue directly. The patient who applies acetylsalicylic acid to the gingival margin of an aching tooth will have a superficial area of necrosis; the necrotic tissue appears white, and the destroyed epithelium can be peeled away in delicate shreds. More caustic substances such as phenol may produce deeper lesions. A simple, direct question regarding the patient's use of drugs topically instead of systemically usually establishes the diagnosis. Discomfort may be ameliorated by the use of a topical anesthetic (lidocaine ointment, for example). One per cent methylrosaniline chloride may help to minimize the possibility of secondary infection.

Heavy metals administered systemically may be deposited in the gingival tissues and elsewhere in the mouth. Salts of bismuth, lead or mercury are the usual offenders. Characteristically, a bluish, well-defined area of discoloration is seen along the gingival margin. A history of therapeutic use of a drug containing a heavy metal, or a history of occupational or accidental exposure to

vapors or solutions containing heavy metals, helps to identify the etiological agent.

Orally administered antibiotics may upset the balance of the bacterial flora of the digestive tract. Thus, the use of penicillin troches or lozenges may lead to prolific growths of fungi such as *Candida albicans*. In such instances, the tongue may be coated and have a white fur, and white patches may form on the inner cheeks and elsewhere in the oral cavity. The topical application of a fungicide (such as nystatin) may be helpful.

Many agents may elicit allergic reactions in the mouth, such as edema, erythema, pain, sensitivity (to touch, heat or condiments), vesicle formation, and fissuring, dryness or scaling of the lips. The tissue reactions occur at the site of contact only; subjective symptoms appear within 24 to 48 hours and may be out of proportion to the objective findings. Itching, burning, or small, shallow ulcers may develop. If contact allergy is suspected, the diagnosis is established by a process of careful history taking (Have you changed to a new brand of toothpaste? Lipstick? When did the symptoms begin? Was there any known event shortly before the time of onset?) The patient is advised to discontinue use of the agent most highly suspected.

A variety of drugs may cause an allergic reaction when administered systemically. Usually, the reaction manifests itself soon ofter the drug is absorbed—within minutes or after several hours.

Severe systemic allergic reactions require prompt treatment. Intramuscular injection of 1:1,000 epinephrine, 0.3 to 0.5 cc. given immediately, and administration of oxygen are emergency procedures.

To minimize the likelihood of an allergic response, each patient should be queried at the time of the first visit to the office, regarding previous episodes of drug sensitivity reactions.

Carr (1951) has listed 51 drugs that have been reported to be responsible for depressing hematopoiesis in bone marrow or in reducing the number of circulating blood cells. Any of these alterations in these blood components may bring about changes in the oral mucosa. Diagnosis is made by questioning the patient regarding use of drugs. Treatment consists of immediately discontinuing the use of the drug and controlling infection by antibiotic therapy. Cooperation between physician and dentist is mandatory. Local discomfort, if present, may be ameliorated by the use of a 10 per cent sodium bicarbonate mouthwash or 1 per cent methylrosaniline chloride applied topically.

Bruckner, Robert J. Dental School, University of Oregon, Portland, Ore. Diagnosis of oral lesions related to the use of drugs and other substances. Oregon D.J. 30:4:2-6 Dec. 1960

Aphthous ulcers

A patient with Parkinson's disease and arthritis found great relief from the administration of benztropine sulfate and phenylbutazone, but complained that these drugs caused small ulcers in the mouth.

In the absence of any other toxic effects from these drugs, it seems unlikely that the oral ulcers were caused by the drugs. It is probable that the patient was suffering from recurrent aphthous ulceration of the mouth, and that this condition may be aggravated by the dryness of the mouth caused by benztropine. A therapeutic trial of lozenges containing hydrocortisone hemisuccinate, which have been found to be the best treatment for aphthous ulcers, is indicated in such instances.

Tavistock Square, London W.C.1., England. Aphthous ulcers. Brit.M.J. No. 5200:748 Sept. 3, 1960

Placebos

The majority of medicines used from the earliest times have been placebos. As each new medicine is introduced, it elicits a cluster of favorable reports, and it is a wise practitioner who treats as many patients as possible with new drugs while they still have the power to heal.

The placebo response has served physicians and dentists well. Because of it they have throughout the centuries been held in high esteem, despite the dearth of medicines with beneficial therapeutic effects.

Many of the medicines commonly administered today are placebos. The potent therapeutic effect is associated with the practitioner himself, and often he can get good results with whatever he

prescribes if he maintains a good relation with the patient, spends some time with him, and tries to understand his problems.

The placebo response may be regarded as a nonverbal communication between patient and practitioner, the affective response to this relation being displaced on to the placebo. If the patient feels that the practitioner is helping him, he will respond to the placebo.

History suggests that it is an advantage if the placebo is expensive: consider unicorn horn, bezoar stones and mandrake roots. Dramatic physical effects also are beneficial: if the patient is inhaling carbon dioxide, obviously he is having "treatment" which is not the case if the practitioner is "only talking."

It is probable that good results are obtained if the practitioner shares the patient's belief that the treatment will be effective.

The placebo effect is not confined to medicines. Treatment by the methods of physical medicine sometimes may have a placebo effect, as may some surgical interventions.

Editorial. Tavistock Square, London W.C.1, England. Placebos. Brit.M.J. No. 5218:43-44 Jan. 7, 1961

Laboratory facilities available to the general practitioner

In many communities, the hospital laboratories are happy to have the practicing dentist submit specimens to them for diagnostic procedures.

Among oral diseases for which the dentist may wish to collect specimens and submit them to a hospital laboratory for analysis are Vincent's infection, oral candidiasis, herpetic lesions, stomatitis of the type occurring after pneumonia or an upper respiratory infection, cervicofacial disease and miscellaneous oral ulcers such as those caused by the spirochete of syphilis or the tuberculosis bacillus. The hospital laboratory also can help with routine root canal cultures. The dentist can use paper points to obtain the specimens, drop the points into thioglycollate broth and send the material to the diagnostic laboratory.

In this era of chemotherapeutic and antibiotic medicine it has become important that the dentist know what is the drug of choice in treatment of an oral infectious disease. In infections which do not respond promptly to the usual course of antibiotics, cultures should be sent to the laboratory for examination and the selection of the most effective inhibiting agent.

The hospital laboratory or private diagnostic laboratory offers advantages to the general dental practitioner.

Fahlberg, Willson J. Texas Medical Center, Houston, Texas. Laboratory facilities available to the general practitioner. J.Oral Surg.,Anesth.& Hosp.D.Serv. 18:504-506 Nov. 1960

Penicillin-streptomycin combinations

If the number of parenteral penicillin-streptomycin preparations available is a reflection of their use, they are being seriously misused; there are few clear-cut indications for simultaneous treatment with the two antibiotics, and for these indications the fixed-ratio combinations are likely to be either inadequately effective or hazardous.

In all common coccal infections requiring antibacterial therapy, the proper dosage of a single antibiotic gives results which cannot be improved by the addition of streptomycin. The most important indication for supplementing penicillin with streptomycin is bacterial endocarditis caused by either *Streptococcus mitis* or *Str. faecalis*. In these infections the combination is much more effective than penicillin alone.

Streptomycin always should be used along with penicillin for endocarditis due to enterococci, or to alpha hemolytic streptococci which are inhibited only by 0.2 units or more of penicillin per cubic centimeter. In such instances, as much as 20,000,000 units of penicillin and 2 Gm. of streptomycin a day may be required for a period of two weeks, after which the dosage of streptomycin is reduced to 1 Gm. daily for an additional two weeks or more. Even when less than 0.2 units of penicillin per cubic centimeter is required for inhibition of alpha hemolytic streptococci, the addition of streptomycin may shorten the course of therapy from about six weeks for penicillin alone to two weeks with the combination.

Most fixed-ratio penicillin-streptomycin combinations contain 0.5 Gm. of streptomycin to each 400,000 units of penicillin. Thus, it is obvious that when 4,000,000 units of penicillin daily are

required for the treatment of a streptococcal endocarditis, such a combination would provide 5 Gm. of streptomycin—an excess of 3 Gm. An excess of streptomycin unnecessarily increases the risk of vestibular nerve damage and of other toxic effects. The occurrence of severe toxic respiratory and central nervous system depressive reactions in pediatric patients treated with penicillin-streptomycin combinations has resulted in a recent requirement by the Food and Drug Administration that manufacturers of such combinations include the following caution in the package insert: "Not for pediatric use." Such reactions as noted may also occur in aged and debilitated persons. The toxicity of streptomycin is one of many reasons for utilizing the simplest effective antibiotic therapy. The use of fixed-ratio streptomycin-penicillin combinations not only is likely to be either unnecessary, ineffective or hazardous, but it tends to encourage the emergence, increase and spread of organisms resistant to penicillin and streptomycin.

136 East Fifty-seventh Street, New York 22, N.Y. Penicillin-streptomycin combinations. M.Letter on Drugs and Therapeut. 3:13-15 Feb. 17, 1961

Treatment of hypersensitive teeth with a strontium chloride dentifrice

In 1956, a Polish investigator, J. Pawlowska, described successful results in treating hypersensitive teeth with applications of a 25 per cent aqueous solution of strontium chloride.

The author has evaluated strontium chloride as an aqueous solution and in a compatible tooth paste base.

Five patients with hypersensitive teeth were treated in the office with a 25 per cent aqueous solution of strontium chloride, applied with a cotton swab. All patients reported complete relief of symptoms within a few minutes of application.

Seventy-eight patients were treated with a test tooth paste having the following ingredients: strontium chloride, 10.0 per cent; deionized water, 36.8 per cent; polyols, 24.0 per cent; water soluble gums, 1.8 per cent; anionic detergent, 1.7 per cent; nonionic detergent, 0.5 per cent; diatomaceous silica, 23.0 per cent; flavor and saccharin, 1.35 per cent; inert coloring agents, 0.75 per cent, and preservative, 0.10 per cent.

Patients issued the dentifrice were instructed in proper toothbrushing technics and given a multitufted brush with soft nylon bristles. The patients reported at periodic recalls, giving their estimates of the degree of relief. Such impressions were confirmed in the chair by observation of the patients' involuntary responses to tactile and thermal stimuli.

Seventy of the 78 patients showed a painful response to application of cold or heat to tooth surfaces; of the 70 patients, 22 also were sensitive to other stimuli. Good to complete relief was secured in 65 patients (83.3 per cent); 5 patients (6.4 per cent) failed to benefit. Generally, results were obtained within a week to one month after treatment began. In other patients, the results came about through progressive improvement over a period of several months.

The dentifrice is nontoxic, nonirritating and is tolerated well.

Ross, Milton R. 255 Third Avenue, Long Branch, N.J. Hypersensitive teeth: effect of strontium chloride in a compatible dentifrice. J.Periodont. 32:49-53 Jan. 1961

Pathology

Osteitis deformans (Paget's disease of bone)

Although it has been 83 years since Sir James Paget described the disease that bears his name, its etiology and treatment still are obscure.

From one to many bones in the individual may be involved. Those under mechanical stress seem most often to be affected. The disease attacks the sacrum, vertebrae, femur, skull, sternum and pelvis most frequently. It has been postulated that the skull is involved so often because of the pull exerted on it by the temporal muscles. The pathologic process is confined to the bone involved; it does not spread across articulations. The disease is prolonged, and afflicted bones are progressively enlarged and deformed. They present a rough, uneven surface. Topographic markings and borders are obliterated, and the compact

bone is replaced by spongy bone which is covered by red dots and streaks because it is highly vascular.

In the skull there is a progressive thickening of the outer table and an increase in density. The new bone is laid down eccentrically and does not encroach on the brain. The classic picture involves the patient who needs larger hats as he grows older. The sutures become obliterated.

The maxilla is involved far more frequently than the mandible. In some patients, the only manifestation of osteitis deformans occurs in the jaws. The teeth of an affected bone become spaced as the disease progresses. The construction of dentures becomes a problem because the enlargement of the bone causes pressure on the mucosa and subsequent necrosis. The mucosa becomes thinner than normal, predisposing to necrosis.

Often, in patients with osteitis deformans involving the jaws, there is an associated otosclerotic deafness, which is a result of involvement of the petrous portion of the temporal bone. In a study of 15 patients with osteitis deformans of the jaws, 3 were deaf and 7 had facial neuralgia.

The initial lesion in osteitis deformans is a region of osteoporosis which can be seen on the roentgenogram. In the jaws, the regions of radiolucency are not well-defined. Demineralized regions appear as coarse, irregular areas of spongy bone, with disorganized, osteosclerotic trabeculations. The lamellas run in all directions; the haversian systems no longer exist. Hypercementosis of the roots of the teeth usually is present. The pulp chambers of the teeth may be partially obliterated because of formation of secondary dentin.

Several other diseases exhibit similar clinical signs or roentgenographic manifestations. Examples are multiple myeloma, osteogenic sarcoma, metastatic carcinoma, osteomyelitis, osteofibroma, and fibrous dysplasia; these diseases can be differentiated chiefly by studies of blood chemistry and biopsies; the history and roentgenograms always are helpful, also, in the differential diagnosis.

A large percentage of patients with osteitis deformans develop osteogenic sarcoma. The malignant change more closely resembles the fibrosarcoma than the typical osteogenic sarcoma; few diseases have a poorer prognosis.

There still is no known effective treatment for osteitis deformans. Patients can be treated symptomatically through the use of analgesics for their pain, and injections of alcohol or surgery for facial neuralgia. Cortisone can be used to reduce the severity of periods of activity and to reduce cardiovascular involvement. The extraction of teeth may be difficult if hypercementosis is evident. A common complication of dental surgery is a stubborn osteomyelitis with draining sinuses. Denture construction requires painstaking, considerate treatment.

Cohen, Stanley R. School of Dentistry, University of Kansas City, Kansas City, Mo. Osteitis deformans (Paget's disease of bone). J.Missouri D.A. 40:16-21 Nov. 1960

Pathogenesis of facial clefts associated with syndactylia

A two year old girl with cleft lip, cleft jaw and cleft palate was referred to the Pediatric Clinic of the Free University of Berlin for surgical repair.

The initial dental and medical examinations revealed the presence of the following additional defects: (1) bifid tongue; (2) syndactylia of the left hand (all five fingers were incompletely grown together); (3) webbed fingers of the right hand; (4) webbed toes of the left foot; (5) extremely high palate; (6) bifid uvula palatine, and (7) positional anomalies of tooth germs and erupted deciduous teeth.

The family history revealed that isolated or combined defects had been observed in some members of the father's family of the last three generations. Additional data about the mother's family and the earlier generations were unobtainable.

Maxillofacial defects are frequently associated with other anomalies, mainly those involving the extremities. It can be assumed that the pathogenesis of such combined malformations must lie in heredofamilial factors. There are certain dominant genes which produce facial clefts. However, the manifestations of these genes vary and are, probably, influenced by the effects of endogenous and exogenous factors. Besides their variation in manifestation, these genes may exhibit a pleio-

tropic pattern which promotes the development of additional malformations in various parts of the human body. In the development of combined anomalies, therefore, teratogenesis must play an important role.

In the case history reported, an autosomal dominant gene with a pleiotropic effect and a varying manifestation or a mutation of two closely-linked genes had promoted the development of the combined defects.

The pathologic mechanism resembles that found in hemophilia; the difference being that hereditary hypoprothrombinemia (hemophilia) is inherited by male children through the mothers as a sex-linked characteristic, whereas in this instance the multiple malformations were inherited by the female children through the fathers as a sex-linked characteristic.

Fuhrmann, W., and Vogel, F. Kinderklinik der Freien Universität Berlin, Assmannshauser Strasse 4/6, Berlin-Wilmersdorf, Germany. Pathogenesis of facial clefts associated with syndactylia: report of case. Mschr.Kinderhk. 108:20-30 Aug. 1960

Ptyalism: cause and treatment

Ptyalism usually is associated with a disorder of the upper intestinal tract. If thorough examination of the salivary glands reveals no evidence of glandular disease, the oral cavity should be investigated because carious teeth often stimulate the flow of saliva. If the oral examination is negative, the patient should be referred to a physician for examination of the neck, esophagus, larynx, pharynx, stomach and duodenum.

Ptyalism often is produced by administration of drugs containing mercury or pilocarpine, or by nervous disturbances. Achalasia, the inability to relax, is accompanied by ptyalism, and so is postencephalitic parkinsonism.

The treatment depends on the determination of the causative factor (or factors). Atropine alkaloids, especially atropine sulfate, given in daily doses of 1 mg., usually arrest the salivation without producing untoward side effects. Overdosage must be avoided, because the possible toxic reactions, such as rapid pulse, flushing of the skin, slight delirium, dilatation of the pupils, elevation in temperature, dryness of mouth, throat and skin, and auditory and visual hallucinations, are more severe than the effects of ptyalism. In instances in which atropine is ineffective in suppression of salivation, the patient should be referred to a roentgenologist for local irradiation of the parotid, submaxillary and sublingual glands.

Böhne, Ch. (13b) München-Gräfelfing, Germany. Ptyalism: cause and treatment. Zahnärztl.Praxis 11: 198 Sept. 1, 1960

Dystrophia myotonica in childhood

The clinical development of dystrophia myotonica in adults commonly is the following: a family history of senile cataracts in an early generation, of presenile cataracts in the next, and finally the full picture of the disease in the third. The early development and evolution of the disease in infants and children are less familiar.

Six cases are reported of children with dystrophia myotonica whose symptoms date back to early infancy. The youngest in whom the diagnosis was made was nine months old. The case reports illustrate that the onset of dystrophia myotonica may be earlier than is generally recognized; that dystrophia myotonica occasionally is responsible for the syndrome of amyotonia congenita (Oppenheim's syndrome), and that dystrophia myotonica occasionally is responsible for the presence of congenital facial dysplasia. Four case histories outlined in an appendix illustrate certain similarities between dystrophia myotonica and Möbius syndrome.

In children as in adults, wasting of the temporal, facial and sternomastoid muscles is an early and characteristic feature of dystrophia myotonica. Four of the six children had facial paralysis at birth, causing difficulty with sucking.

In three children palate movement was poor and resulted in nasal speech. In no patient was myotonia or wasting obvious in the tongue.

All the six children were limp and floppy infants. In three children, bilateral talipes were found at birth.

In adults, the onset usually is insidious and deterioration is slow. The immobile face and sucking difficulty dating from birth seem to indicate that the degenerative process started *in utero*.

Dystrophia myotonica is inherited as if due to a dominant gene with variable manifestations. The disease increases in severity in succeeding generations. The affected parent in all six patients was the mother; with one exception the mother had minimal features of the disease.

Vanier, T. M. Hospital for Sick Children, Great Ormond Street, London, England. Dystrophia myotonica in childhood. Brit.M.J. No. 5208:1284-1288 Oct. 29, 1960

Lymphangioma of the tongue: treatment and appraisal of long-term results

When lymphangioma involves the tongue, special clinical problems are created. At the early stage of life when the lesion first appears, the soft, malleable mandible and its dental structures eventually become distorted because of the tongue's constant pressure. As the tongue increases in size, it no longer can be housed within the oral cavity and protrudes from the mouth. This results in the teeth being forced outward, so that occlusion no longer is possible. Outward bowing of the mandible appears for the same reason, and usually involves the horizontal ramus.

Eight patients with lymphangioma of the tongue were treated. In all, the neoplasms in the tongue had been noted at or shortly after birth by the parents. The tumors appeared on the surface of the tongue and adjacent floor of the mouth as tiny, grapelike excrescences; most were similar in color to the pink of the rest of the tongue, but frequently with an admixture of purplish blisters indicating a dual hemangiomatous and lymphangiomatous composition. The individual blebs averaged 1 to 3 mm. in diameter and, when pricked, leaked typical clear lymph.

Periodic episodes of superficial ulceration and infection with pronounced increase in swelling of the tongue were reported in all patients. In two patients, the soft tissues in the submaxillary triangle and parotid region also were affected.

In almost all instances, the infiltration of tongue and adjacent soft tissues was too extensive for complete eradication. Further growth of the tumor must be considered a possibility throughout the period from birth to the completion of adolescence.

Effective treatment should be based on the fairly certain knowledge that this lesion is not potentially fatal, that it produces difficulty primarily because of the increase in size of the tongue and its associated pressure on malleable adjacent structures, and that complete extirpation is not necessary for favorable results. Extremely radical operations aimed at total excision, therefore, are to be condemned. The simple objective of surgery is to remove enough of the tongue so that the organ will fit comfortably within the mouth, not impinge on the teeth and not press on the mandible.

Prior to operation, the lines of excision should be indicated on the tongue with marking ink. As soon as any excision is begun on the tongue, that organ begins to swell under the trauma, so that unless the lines of excision are marked, judgment will be faulty as to the exact amount of tissue requiring removal.

Lymphangioma of the tongue is not especially sensitive to roentgenotherapy. Although the size of the tumor can be reduced by roentgenotherapy, the patient is subjected to a level at which roentgenotherapy will have a sclerosing effect. The side effects in terms of arrest of development in the mandible, irreparable damage to dental structures, plus the fact that the tumor persists after treatment, negate the use of this treatment.

The eight patients were followed for from 1 to 14 years after treatment. Experience indicates that after the patient attains his full bodily growth, the lymphangioma stabilizes and does not increase in size.

Morfit, H. Mason. University of Colorado School of Medicine, Denver, Colo. Lymphangioma of the tongue: treatment and appraisal of long-term results. Arch.Surg. 87:761-767 Nov. 1960

dental health

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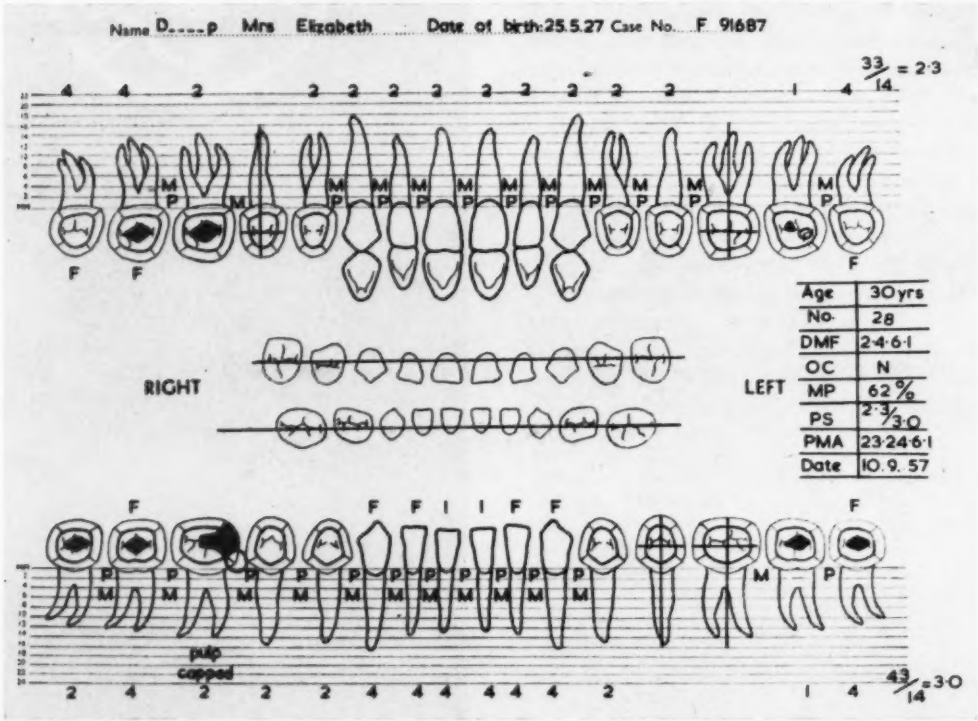
Epidemiology

A method of recording the state of dental health

A standard and universally accepted method of recording clinical findings and of representing the condition of the dentition in numerical terms is what every dentist, public health officer, research worker and statistician realizes is necessary. For the past five years the department of periodontology of the School of Dental Surgery of Edinburgh University has routinely recorded numerical estimations of clinical findings. Anyone conversant with the code can form a good estimate of the dental health of the patient. The principle of the method is to collate valuations of clinical findings in a standard table. No examination can be completed unless the condition of each tooth, its supporting structures, and the related soft tissues, has been investigated critically. The completed table is the expression of a considered opinion and judgment formed from the facts. It expresses, in minimum space, information on the clinical state at the time of examination. The method has been taught with success to dental students. The average time required to chart and compile the table is about 15 minutes.

The age of the patient is taken into account, plus information obtained from the following detailed examination of the teeth: the teeth (number present, caries, restorations); occlusion (classification of occlusion and effectiveness for mastication); the periodontium (stability of the teeth, state of alveolar bone, and state of gingiva). For each of these sections of the examination a numerical valuation can be made which will correspond to the clinical state. Numerical valuations have been employed in dental surveys of caries, malocclusions, gingivitis and other periodontal conditions.

Clinical chart of a patient showing result of examination and the completed dental score



The methods utilized are: DMF and dmf (for deciduous teeth) indexes; Angle's classification of occlusion; MP (masticatory potential, Galloway, 1956); PS (periodontal score, Russell, 1956, modified); stability of the teeth (Miller, 1950), PMA index (Massler, Schour and Chopra, 1950, modified). Each of these estimated values is tabulated to form the "dental score," which is the statistical appraisement of the health of the dentition.

The illustration, a clinical chart of a patient, shows the result of examination and the completed dental score. From the figures in this chart and table alone, the following report could be framed:

"This patient is a 30 year old woman. The 28 teeth which are present are in normal occlusion but the loss of four teeth has reduced the effectiveness of the dentition for mastication. Eight of the remaining teeth have been affected by caries. Six of these teeth have been satisfactorily restored but two show evidence of untreated caries. Caries has caused only a moderate degree of destruction in the affected teeth. There is a generalized chronic gingivitis, mild in degree of severity, but this condition is progressing to chronic periodontal disease and probably there is already some alveolar resorption. Provided the general health is satisfactory, the prognosis in this case should be fairly good.

"The general plan of treatment for this patient should be as follows: (1) scaling, (2) treatment of chronic gingivitis, (3) treatment of caries, (4) instruction in oral hygiene and gingival massage, (5) elimination of any periodontal pockets, (6) correction of any traumatic occlusion and consideration given to replacement of the missing teeth, and (7) regular supervision after completion of treatment."

Tabulated data can be used as: (1) an aid in forming an opinion of the dental condition; (2) an aid in the assessment for prognosis; (3) a means of comparing the dental health at different ages; (4) a means of comparing dental health before and after treatment; (5) a means of analyzing statistically the dental health of communities or selected groups; (6) a means of registration of dental data of individuals or groups; (7) a means of international standardization of dental recording, and for the transmission of dental information for forensic and other purposes.

Galloway, J. W. School of Dental Surgery, Edinburgh University, Edinburgh, Scotland. A method of recording the state of dental health. Brit.D.J. 109:498-506 Dec. 20, 1960

Caries etiology and control

Clinical acceptance of stannous fluoride prophylaxis paste

A stannous fluoride-silex-silicone prophylaxis paste formulated for use in the U.S. Air Force preventive dentistry program was evaluated as to its acceptance by 98 children ranging in age from 4 to 17 years.

The formula of the paste is:

Solid phase: stannous fluoride, 100 Gm.; silex, extra fine, 300 Gm.; sodium borate, extra fine, 30 Gm., and sucaryl, 3.0 Gm.

Liquid phase: silicone, 20 ml.; liquid petrolatum, 80 ml.; oil of peppermint, 5 ml., and oil of anise, 5 ml.

After completion of the prophylaxis procedure, each patient was asked to indicate on a scale of ten (0 = bad, 10 = good) his opinion of the taste. The operator also was asked to indicate his objective opinion of the patient's acceptance of the paste, and to judge the cleaning ability (abrasiveness) of the paste. Taste assessed by the patient averaged 4.72. The operator's rating of the patient's acceptance averaged 5.66. Operator rating of the paste's abrasiveness averaged 6.65.

The most important steps contributing to success or failure of the clinical trial were the application and rinsing technics practiced by the dentist or oral hygienist. The paste, because of the fluoride content, was carefully used, and was applied with a soft rubber cup at a relatively slow speed. After each polishing interval, the mouth was well flushed with a stream of water from the water syringe, followed by a double rinse from a cup by the patient. Thorough stripping of the interproximal areas with the paste was necessary to assure adequate application of stannous fluoride to these caries-vulnerable areas.

Staining of tooth structure was not a problem. Slight stains sometimes appeared in hypocalcified areas or on the defective margins of silicate restorations. These stains were easily removed with an extra-fine cuttlefish strip. Blanching of gingival tissues was minimized or eliminated by the rinsing technic.

Use of the paste required no more time than for a routine prophylaxis. Use of the paste is indicated as part of any public health or private office preventive dentistry routine.

Hester, H. C.; Witzel, E.; Stillwell, E., Jr.; Segreto, V.; Harris, N., and Hester, W. Arcade Building, Glen Ridge, N.J. Clinical acceptance of stannous fluoride prophylaxis paste. J.Den.Children 27:282-285 Dec. 1960

Service requirements in dental prepayment

This report is the third of a series based on data from the dental care program of Group Health Association, Inc., Washington, D.C. The study summarizes the maintenance care experience for 1,194 persons during the first eight years (1949 to 1957) of operation of the association's simulated prepayment dental program. The analysis is restricted to data for those persons whose continuous participation extended over at least four full years. The total experience was equivalent to 6,742 person-years of participation, and averaged 5.6 years per person.

The findings present further evidence of constancy in over-all demand for dental service by a group once a maintenance regimen is established, despite wide variations in the demands of persons and subgroups. Of interest are the time trends in broad categories of care; the demand for plastic fillings, for inlays, crowns and bridges, and for dentures declined with succeeding years of maintenance care, whereas diagnostic and other service demands increased somewhat.

Average demands for service were much lower for children than for adults. Although a sharp downward trend with age was apparent for plastic fillings, the cost of inlays, crowns and bridges was much higher for adults than for children. Similarly, the cost of dentures and other services increased regularly with increase in age. The average cost of plastic fillings was reduced from $13.43 for children to $7.87 for adults 45 years old and older. The cost of inlays, crowns and bridges, which was only $1.22 for children, was about ten times this amount for each of the adult groups (25 to 44 years old, and 45 years old and older). The cost of dentures was $0.86 per year for young adults and reached $3.54 for those 45 years old and older. The miscellaneous group of services expanded from a cost of $2.48 per year for children to $5.08 for the older adults.

In the average year, services for a third of the group cost less than $20; for nearly half, the cost was between $20 and $59, and for the remaining sixth the cost was $60 or more. Although costs of services to persons in the study group varied widely in a given year, the data indicate a pronounced subsequent tendency for the average costs to low, medium and high users of service to approach a norm. Thus, it would be anticipated that over an extended period the range of differences in cost between high and low use groups would diminish substantially.

Three basic measures of utilization—clinic visits, chair time, and cost of service—showed consistently higher values for the 203 persons who had joined the prepayment plan than for nonjoiners. The joiners made one full visit more per year, utilized a half hour more chair time, and received services costing $10 more. Their pattern of service included substantially higher costs for diagnostic services and plastic fillings and for inlays, crowns and bridges. Given this evidence, it is not surprising that the costs of operating the prepayment plan greatly exceeded original expectations.

Smith, Quentin M., and Pennell, Elliott H. Division of Dental Resources, U.S. Public Health Service, Washington, D.C. Service requirements in dental prepayment. Pub.Health Rep. 76:11-18 Jan. 1961

Prevention of dental caries

As there is little certain knowledge about the mechanism of the carious process in dental enamel, any preventive measure advocated must be regarded as empirical, although most preventive measures can be explained according to Miller's classic theory. There is little precise knowledge, based on well-controlled studies, of the value

of most of the generally accepted methods for preventing caries.

Experiments with germ-free animals have shown that the presence of microorganisms is essential for caries development. Many investigations have shown that restricting the intake of quickly fermentable carbohydrates, especially sticky ones, is effective in reducing the incidence of caries. There is little evidence to confirm that either toothbrushing or eating fibrous foods at the end of a meal is of value in preventing caries.

Recently, claims have been made that the use of dentifrices containing fluorides, and especially stannous fluoride, reduces the incidence of new caries. Most of these clinical trials with stannous fluoride dentifrices appear to have been well conducted, but experience of previous dentifrices containing other supposedly beneficial medicaments suggests it would be wise to await further evidence before accepting these claims fully.

Extensive, well-controlled clinical investigations carried out in many countries during the last 25 years have shown that the presence of fluorine (fluoride ion) at suitable levels in drinking water usually reduces by between 50 and 70 per cent the incidence of new caries in teeth which developed during the period of administration. There is some evidence that minor beneficial effects accrue from fluoridation even after the teeth have erupted. It would appear that if any harmful effects develop from the artificial fluoridation of water, they are either very rare or of such a minor nature that they have not been shown to affect the expectation of life.

The classic studies of Lady Mellanby showed that vitamin D is essential for the formation of sound dental structure, but the value of an adequate intake of vitamin D in preventing caries still is controversial. Although there is little doubt that caries can be prevented to a large extent by the elimination of our so-called civilized diet, the attractiveness and cheapness of modern refined foods make this an impracticable solution.

Fluoridation of the water supplies and possibly the use of therapeutic dentifrices may be shown in the future to be safe and effective measures which easily could be applied on a large scale. In the meantime the incidence of caries can be reduced by a combination of methods which are acceptable to many people. Especially important are thorough toothbrushing and mouth rinsing, advice and treatment suitable for the individual patient by dentists experienced in preventive measures, and the restriction of eating between meals.

Editorial. Tavistock Square, London W.C.1., England. Prevention of dental caries. Brit.M.J. No. 5221:262-264 Jan. 28, 1961

Chewing gum as a vehicle for the administration of fluoride

Chewing gum was tested as a vehicle for the topical application of fluorine (fluoride ion) to children's teeth. Essential requirements of such a gum are that sweetening agents should have no cariogenic activity and that there should be a low calcium content. A chewing gum was prepared according to the following formula: chewing gum base, 28 per cent; Staybelite Ester N/10, 18 per cent; sorbitol, 24 per cent; potato starch, 28 per cent; saccharin, 0.3 per cent; vanilla, 0.15 per cent; peppermint oil, 1 per cent, and oil of spearmint, 0.55 per cent. The gum was warmed to a semi-fluid consistency, radioactive fluoride was mixed with it, and the gum was cut into pieces weighing about 1 Gm. each; each piece contained 1 to 2 microcuries of F^{18} at the time of use.

The subjects were children with caries-free teeth to be extracted for orthodontic reasons. Each child was given a piece of gum to chew for 10 minutes immediately prior to the extraction. Each extracted tooth then was cleaned by scrubbing for 5 minutes wth a soft nail brush; the tooth then was placed in a polythene container. Radioactivity in the extracted tooth was measured by placing the tooth in a well-type scintillation counter. Radioactivity in the piece of gum also was counted before and after chewing.

About 80 to 90 per cent of F^{18} was released from the gum in 10 to 15 minutes of chewing. The uptake of fluoride by a bicuspid was about 20 millimicrograms after 10 minutes of chewing of gum containing 100 micrograms of fluoride.

The rate of release of fluoride was not affected by the addition to the gum of 5 per cent calcium carbonate, but the addition of 2 per cent citric acid caused the retention of a large fraction of

fluoride. This was offset by a higher uptake of fluoride by the teeth. Stannous fluoride was released slightly more rapidly from the gum than sodium fluoride, but there was no evidence of a difference in uptake by the teeth.

The results suggest that little isoionic exchange with enamel fluoride occurs, and that the measured uptake represents a true increase in the fluoride content of the enamel. Proof of this, however, will depend on chemical analysis of enamel exposed to fluoridated chewing gum over long periods.

Emslie, R. D.; Veall, N., and Duckworth, R. Department of Preventive Dentistry, Guy's Hospital, London S.E.1, England. Chewing gum as a vehicle for the administration of fluoride studies with ^{18}F. Brit.D.J. 110:121-127 Feb. 21, 1961

Fluoridation of drinking water in Czechoslovakia: The Tábor project

In 1956, the fluoridation of the municipal water suply of Tábor, a town in southern Bohemia with a population of about 15,000, was initiated under the supervision of the Czechoslovakian Dental Research Institute and the Federal Fluorine Commission. Pisek, a neighboring town with a population of about 17,000, was selected as the control.

A significant increase in the percentage of caries-free children in Tábor, in comparison with the children in Pisek, was observed during periodic dental examinations in 1959.

The 1960 survey revealed a continued reduction in the caries incidence in Tábor. The DMF index in 1959 showed in the age group between 9 and 11 years an average of 1.13 in Tábor, and 4.21 in Pisek; in 1960, 1.22 in Tábor, and 3.68 in Pisek; in the age group between 12 and 14 years in 1959, 2.55 in Tábor and 7.94 in Pisek; in 1960, 2.33 in Tábor and 7.46 in Pisek.

After the evaluation of the 1960 data, there can be no doubt as to the efficacy of fluoridation of drinking water. A team of governmental appointed experts consisting of pediatricians, pedodontists, biologists and public health officers (dental and medical) have found no signs of harmful effects caused by consumption of fluoridated drinking water containing 1 ppm fluorine.

Prior to fluoridation, the nutritional and physical conditions were almost similar in both groups of children.

Jiráskova, Marie. Dental School of the University of Prague, Stalinova 48, Prague, Vonohrady, Czechoslovakia. Fluorizace pitné vody ČSSR.: Vysledky vyšetřeni před zahájenim pokusné fluorizace v Táboře. Ceskoslov.stomat. 60:411-418 Nov. 1960

Lactobacillus and dental caries

The following considerations have led to the conclusion that any mouth organism capable of producing high concentrations of acid on the tooth surface can be as important, or more important, than lactobacilli:

1. The association of an organism with a disease does not establish causality, and could be the result of conditions produced by the disease.

2. The lactobacilli never make up more than 1 per cent of the total oral flora, whereas other active acid producers are major constituents.

3. Common streptococcic types in the mouth are much more active acid producers than lactobacilli.

4. The association of increased lactobacillus counts with dental caries is not a completely constant one.

5. Coccal and filamentous forms, as well as bacillary forms, are found in the advancing front of carious dentin or enamel.

6. The elimination of cavities has the effect of reducing the lactobacillus count, which fact suggests that the conditions provided by carious or precarious lesions are responsible for the increased numbers of lactobacilli found in association with caries.

7. It has been possible to produce caries in gnotobiotic animals by infection with streptococci, but not by infection with lactobacilli.

In short, oral bacteriologists have returned to the theory of W. D. Miller, who suggested that any organism capable of producing acid on the tooth surface would serve as a cause of initiation of dental caries.

Bibby, B. G. Post Office Box 879, 800 Main Street, Rochester, N.Y. Lactobacillus and dental caries. J.A.M.A. 175:739 Feb. 25, 1961

dental patents

Following are recent patents relating to dentistry granted by the U.S. Patent Office:

June 21, 1960

2,941,295 Arthur C. Jermyn
Inserts for artificial teeth

2,941,890 Paul I. Zandberg and Harry Leonard Diamond
Dental stone or plaster

June 28, 1960

2,942,925 Milton H. Bebling
Toothbrush holder

July 12, 1960

2,944,293 Philander B. Taylor
Denture material composition and method of producing dentures

2,944,341 Henry M. Lane
Dental forceps

July 19, 1960

2,945,299 Carroll S. Fritz
Dental handpiece

2,945,496 Alfred Fosdal
Dental instrument for immobilizing tissue

July 26, 1960

2,946,072 Edward Z. Filler
Massage and brush type single-use toothbrush

August 2, 1960

2,947,018 Milton B. Silverman
Audible toothbrush

2,947,082 Herman Epstein
Crystal driven dental tool

August 9, 1960

2,948,007 Florent Tangvay
Fountain toothbrush

2,948,009 Phillip J. Mesi
Folding toothbrush with a positive latch

2,948,018 Marcle Hintermann and Philipp Ostermann
Apparatus for the production of dental plates and the like from plastic material

August 16, 1960

2,948,963 Irving Neustadter
Dental jacket crowns and frames therefor

2,949,107 Eugene Russell Ziegler
Apparatus for determining the vitality of teeth

August 23, 1960

2,949,671 Lloyd P. Flatland
Dental handpiece transmission

August 30, 1960

2,950,533 Cwi Sommerstein
Dual saliva ejector

2,950,534 Max Pletman
Dental instrument

September 20, 1960

2,952,914 John H. Schackelford
Articulator for the correction of malfunctioning muscles of mastication

dissertations

Total filtration required in dental radiography from standpoint of film contrast and patient protection. *James W. Miller. 1960.* M.S. *University of California.*

A study of the effects of certain variables on the comparable strengths of soldered and cast bridge joints. *Roland W. Dykema. 1961.* M.S.D. *Indiana University.*

A study of the comparative accuracy of elastic impression materials utilizing partial denture impressions. *Donald M. Cunningham. 1961.* M.S.D. *Indiana University.*

A microradiographic and x-ray densitometric study of cementum. *Narendar Nath Soni. 1961.* M.S.D. *Indiana University.*

A study of the occurrence of pigmentation in incipient and advanced carious lesions of teeth exposed to stannous fluoride: its association with caries incidence and oral hygiene. *Edward Joseph Hyde. 1961.* M.S.D. *Indiana University.*

A longitudinal cephalometric study of several factors involved in overbite correction and recurrence in Class II (Angle) malocclusions. *William Kelley Carr. 1961.* M.S.D. *Indiana University.*

A histopathologic study of the periodontium in hibernating and nonhibernating thirteen-lined ground squirrels. *Wen-shui Shih Hwang. 1960.* M.S. *State University of Iowa.*

Premature atypical resorption of primary teeth resulting from ectopic eruption of permanent teeth. *William F. O'Meara. 1960.* M.S. *State University of Iowa.*

Fetal uptake of orally administered radiocalcium in rats. *James W. Bawden. 1960.* M.S. *State University of Iowa.*

A flasking, packing and curing process for complete dentures. *G. Conrad Hornbuckle. 1961.* M.S. *State University of Iowa.*

An impression procedure for immediate maxillary dentures. *Duane M. Erickson. 1961.* M.S. *State University of Iowa.*

A study of angular changes between the posterior border and the inferior border of the mandible. *Frederick L. Buchman. 1960.* M.S. *State University of Iowa.*

Anteroposterior relation of opposing permanent first molars in association with molar eruption sequence and deciduous molar occlusion. *Donald B. Carlsen. 1960.* M.S. *State University of Iowa.*

An investigation of the effect of zinc phosphate cement on the calcium dissolution of intact enamel and the influence of topically applied stannous fluoride. *Milton Panzer. 1961.* M.S. *State University of Iowa.*

Growth in an oblique dimension of the face in childhood and adolescence. *Thomas Mear. 1961.* M.S. *State University of Iowa.*

Association between ages of eruption of different permanent teeth. *Jack Sturdivant. 1961.* M.S. *State University of Iowa.*

Inferior-superior cephalometric roentgenography of persons with cleft palates: a methodologic investigation. *Eldon D. Bills. 1961.* M.S. *State University of Iowa.*

A comparative evaluation of fractures of the mandibular condyle treated by the open versus the closed technic. *Fred E. Clark. 1960.* M.S. *University of Kansas City.*

Study of pulpal tissue for inflammation and hyperemia following orthodontic tooth movement. *David K. H. Dung. 1960.* M.S. *University of Kansas City.*

A procedure for parenteral injection of the temporomandibular joint of the cynamologus monkey. *Wendell V. Arndt. 1960.* M.S. *University of Kansas City.*

A study of normal Class I occlusions and Class II malocclusion through the use of the physioprint. *Robert E. Cater. 1960.* M.S. *University of Kansas City.*

A radiographic study of the hyoid bone position in Angle's Class I, II and III malocclusions. *Lloyd E. Grant. 1960.* M.S. *University of Kansas City.*

An evaluation of the emotional response of the child dental patient to injections. *Anthony L. Ingino. 1960.* M.S. *University of Kansas City.*

A modification of peripheral nerve resection in the treatment of trigeminal neuralgia. *William R. Johnson, Jr. 1960.* M.S. *University of Kansas City.*

A study of changes in cephalometric measurements during orthodontic treatment of Class II Division 1 malocclusion patients. *Olin E. Wyatt, Jr. 1961.* M.S. *University of Kansas City.*

Vital staining of the periodontium of white mice. *Richard E. Stallard. 1959.* M.S.D. *University of Minnesota.*

The effect of partial calvariectomy upon the growth and development of the skull and the dental relationship in the albino rat. *Fred J. Hammerly. 1960.* M.S.D. *University of Minnesota.*

A comparison of the bacterial flora of the deep periodontal pocket and the healthy interdental area by gram reaction and morphology. *Edward G. Wilkinson. 1960.* M.S.D. *University of Minnesota.*

Growth rate of incisor teeth in golden syrian hamsters. *Permeshwari S. Bhargava. 1960.* M.S.D. *University of Minnesota.*

A quantitative study of bone regeneration in the rat calvarium after decalcified bone matrix implantation. *Franklin R. Stickel. 1960.* M.S.D. *University of Minnesota.*

Cultivation in vitro of adult human skin and oral mucosa on gelatin film. *Jerome B. Smulow. 1961.* M.S. *Tufts University.*

A survey of the oral conditions of the cerebral palsied with special attention to the occlusion. *Kenneth D. Oler. 1961.* M.S.D. *University of Washington.*

An evaluation of the heart rate of the preschool child in the dental environment. *John C. Peterson, Jr. 1961.* M.S.D. *University of Washington.*

An investigation of the genetic control of growth of the bones of the human craniofacial complex. *Franklin D. Piacentini. 1961.* M.S.D. *University of Washington.*

The sequential morphology of the developmental stages of the mandibular first primary molar. *John R. Rogers. 1961.* M.S.D. *University of Washington.*

A study of the mandibular dentition of the Alaska fur seal fetus. *James H. Takano. 1961.* M.S.D. *University of Washington.*

Anatomy and function of the temporomandibular joint. *Gösta Lindblom. 1960.* DR.ODONT. *Royal School of Dentistry, Stockholm, Sweden.*

The reticuloendothelial system and resistance to bacterial infection. *J. G. Howard. 1960.* M.D. *University of London.*

Studies in ion binding by components of bone. *N. A. Myers, 1960.* M.SC. *University of London.*

A study of taste in cattle. *H. L. Williams. 1960.* M.SC. *University of London.*

An investigation into the origin of the cells of the epithelial attachment in the albino rat. *W. S. Alldritt. 1960.* M.D.S. *Queen's University of Belfast, Northern Ireland.*

A study of vascular patterns of teeth, with particular reference to their development. *D. Adams. 1960.* M.D.S. *Queen's University of Belfast, Northern Ireland.*

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